

PUBLIC HEALTH REPORTS

VOL. 47

FEBRUARY 12, 1932

NO. 7

THE EFFECT OF LITHIUM CHLORIDE ON THE MORPHOLOGY OF STREPTOCOCCUS SCARLATINAE

By R. R. SPENCER, *Surgeon*, and W. G. WORKMAN, *Assistant Surgeon, United States Public Health Service*

A marked pleomorphism of certain bacterial species is readily induced by aging or growing them in media that are more or less unfavorable. These "involution forms," formerly so-called, are no longer regarded by many competent bacteriologists as abnormal, retrograde, or degenerative bodies. The studies of Almquist (1), Enderlein (2), Lohnis (3), Hort (4), Mellon (5), and Hadley (6), to mention only a few, suggest that these forms represent normal phases or stages in the life cycle of the species. Lohnis, in studies upon *Azotobacter*, found that this organism "may present itself in not less than 14 types of growth all so different from each other that they would have to be accepted as separate species belonging to five or six different genera."

The addition of 0.5 or 1 per cent lithium chloride to the media has been found by many investigators to be a simple and effective means of inducing these pleomorphic changes after only a few hours' incubation. For example, Kuhn (7) has described the so-called "Pettenkoferiaformen" when cholera vibrios were grown in the presence of lithium chloride, and Hadley and his coworkers in their studies upon the filterable forms of *B. dysenteriae* (Shiga) induced by the addition of lithium chloride to the broth media have also noted many rod forms that appear to be undergoing granulations as well as enlarged cells usually round or oval and referred to as "balloon" bodies, with a diameter of 2 to 7 micra. Hadley believed these forms to be similar to the Pettenkofer bodies of Kuhn.

In studies of the *Salmonella* group of organisms Gray (8) has called attention to "involution forms" of swollen rods or coccoid bodies developing in the presence of lithium chloride broth or peptone water which were used as selective media for staphylococci and *B. fecalis alkaligenes*.

B. pestis which produces the classical involution forms in 2 per cent salt agar developed in our hands identical forms in 0.5 per cent lithium chloride broth after a few hours' incubation. Figure 1 is a

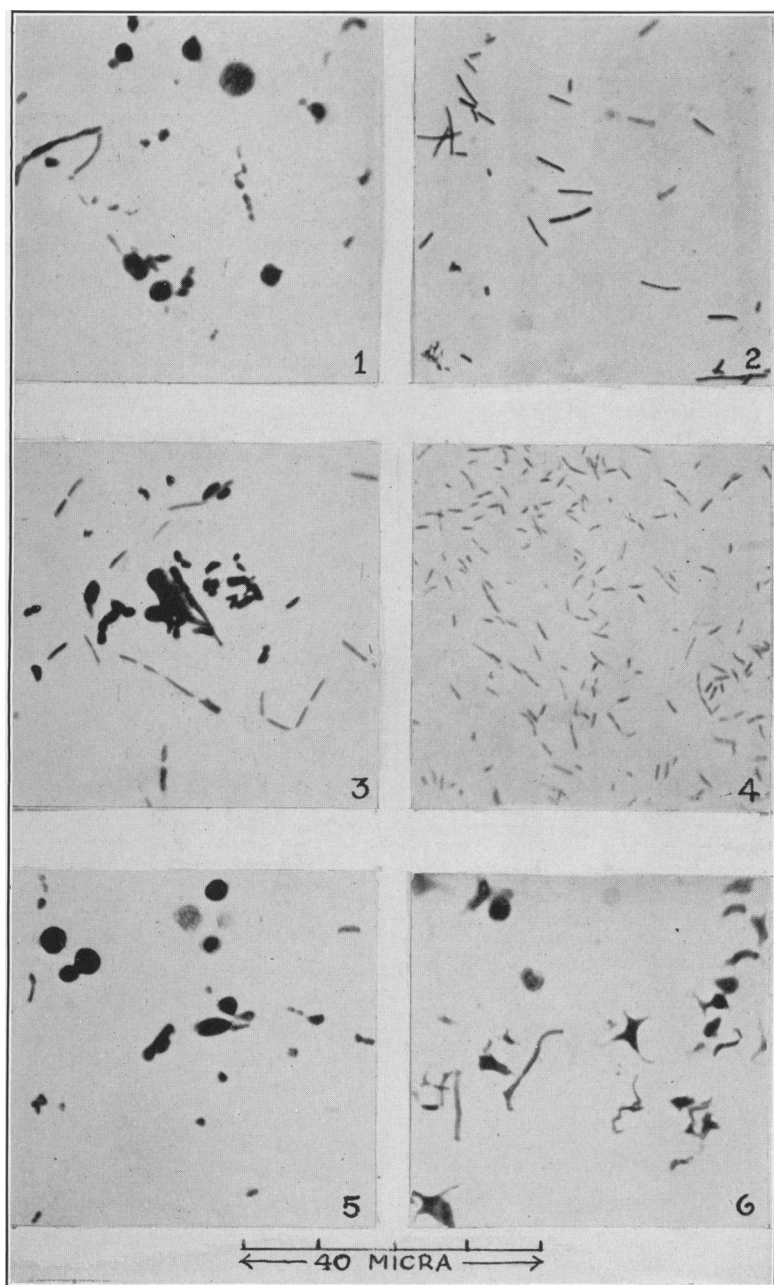
photomicrograph of *B. pestis* after only six hours' growth in lithium chloride broth.

In lithium chloride cultures of *Streptococcus scarlatinae* we have observed almost without exception an abundance of certain ring forms which have been invariably absent from the controls (cultures of the same organism in plain broth) and from lithium chloride cultures of *B. coli*, *B. proteus* X₁₀, and *B. pestis*. Similar forms have been seen, however, in lithium chloride cultures of *Staphylococcus aureus*, but not in cultures of pneumococcus and meningococcus. We have not tested other species of cocci. We consider these forms of sufficient significance to be recorded since they can be produced so readily in lithium broth and, so far as known, have not heretofore been mentioned in the literature; but we have not attempted as yet to interpret their significance. Furthermore, our observations on the development of streptococcus in lithium chloride seem to lend support to the conception of the fusion of two or more individuals, but we are not prepared to say that this is a sexual phenomenon.

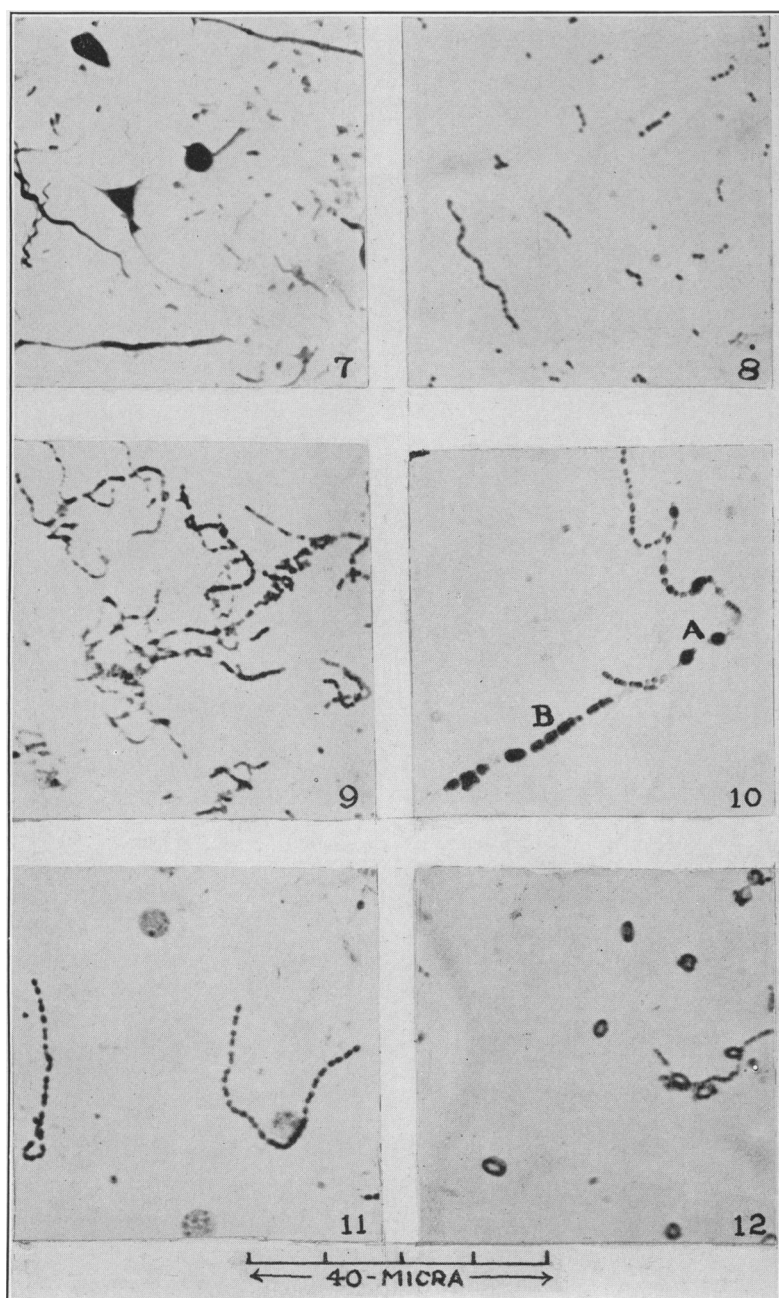
The effect of the chlorides of other salts (potassium, strontium, and magnesium) was also tried upon various organisms, but lithium chloride was by far the best for inducing morphological changes. Figure 3 is a photomicrograph of a 24-hour lithium chloride broth culture of *B. proteus* X₁₀, and Figures 5, 6, and 7 are photomicrographs of cultures of *B. coli* after 1, 2, and 5 days' growth, respectively, in the same media. A very wide range of pleomorphism is observed. One may distinguish cocci, bacilli, filiforms, spirillae, branching rods, triangular forms, and pyramidal shapes, as well as giant ovals and giant cocci. None of these unusual forms is seen in the plain broth control cultures of *B. proteus* X₁₀ (Fig. 2) and *B. coli* (Fig. 4).

Figures 8 and 9 are the control cultures of streptococcus after 2 and 10 days, respectively, in plain broth. There is no pronounced change in morphology. However, Figures 10 to 16, inclusive, represent cultures of the same organism in lithium chloride broth after varying intervals.

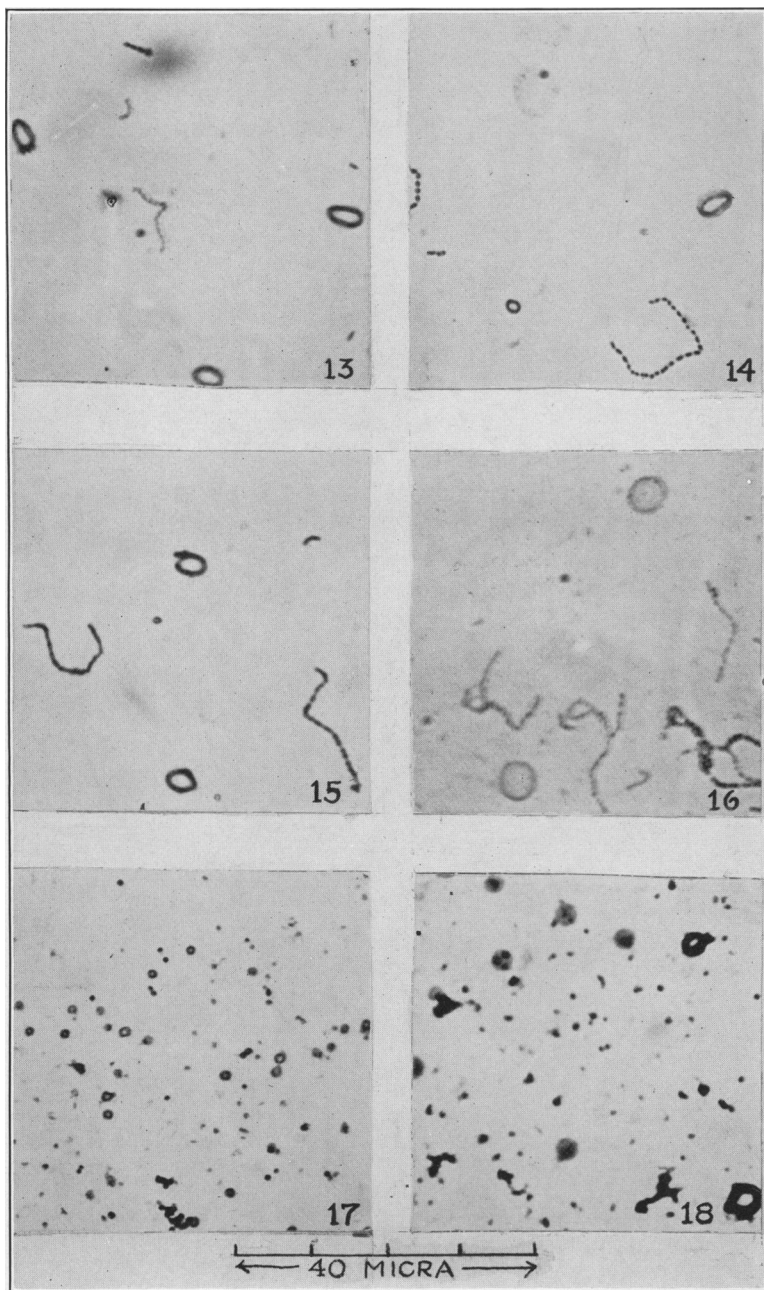
We believe that the streptococcus, because of its chain formation, is a more suitable organism than most others for the study of bacterial fusion, or what some might call "isogamic conjugation" or zygospor formation. In Figure 10 can be seen a chain of streptococci in which giant cocci (zygospores?) are being formed. Along that part of the chain where the individuals are normal in size there are about eight or nine cocci within a distance of 10 micra, while in another section of equal length in the same chain there are only two enlargements (zygospores?) with spaces on either side showing no stainable substance or else mere shadows (A). This same chain of organisms gives the impression (at B) that the enlargement has been formed by the fusion and concentration of the substance of two or more individuals



1, *B. pestis* 6 hours' growth in lithium broth; 2, *B. proteus* X₁₉ 24 hours' growth in plain broth; 3, *B. proteus* X₁₉ 24 hours' growth in lithium broth; 4, *B. coli* 4 days' growth in plain broth; 5, *B. coli* 24 hours' growth in lithium broth; 6, *B. coli* 48 hours' growth in lithium broth



7, *B. coli* 5 days' growth in lithium broth; 8, *Strep. scarlatinae* 2 days' growth in plain broth; 9, *Strep. scarlatinae* 10 days' growth in plain broth; 10, *Strep. scarlatinae* 24 hours' growth in lithium broth; 11, *Strep. scarlatinae* 3 days' growth in lithium broth; 12, *Strep. scarlatinae* 5 days' growth in lithium broth



13, *Strep. scarlatinae* 5 days' growth in lithium broth; 14, *Strep. scarlatinae* 5 days' growth in lithium broth; 15, *Strep. scarlatinae* 5 days' growth in lithium broth; 16, *Strep. scarlatinae* 14 days' growth in lithium broth; 17, *Staph. aureus* 10 days' growth in lithium broth; 18, *Staph. aureus* 10 days' growth in lithium broth

without breaking the continuity of the chain. In other words, the picture suggests a flow of substance along the axis of the chain to certain points of concentration, thus forming the zygospor (isogamic conjugation?). This appearance is by no means unusual in lithium chloride cultures of the streptococcus with which we worked and has been observed innumerable times.

Figure 11 shows giant cocci separate from the chains and containing small granules which, without proof, we assume to be gonidia or regenerative bodies, described by various workers.

In Figures 12, 13, 14, 15, and 16 we see various sizes of the ring forms, the significance of which is unknown. From a study of numerous preparations we have obtained the impression that some of the rings at least are formed by loops of the normal streptococcic chains, the individual organisms of which subsequently coalesce into an evenly stained protoplasmic ring. On the other hand, in preparations of *Staphylococcus aureus* grown in lithium chloride broth, rings seem to appear as enlargements of a single organism. (Fig. 17.)

In stained preparations the giant cocci and ring forms are brought out better by alcoholic fixation than by heat fixation, which latter method seems to distort or destroy them. The Giemsa stain is also to be preferred.

While our observations strongly suggest that some of these unusual forms are developed by means of the fusion of two or more individual cocci, as yet we have not been able to prove that they are regenerative bodies which give rise to new forms. The actual transformation of the spherical and globular elements into normal forms has been observed in cultures of typhoid and other organisms by Almquist (1). A large number of normal streptococcic chains are always to be found in all lithium chloride cultures, and when transfers are made from such cultures to plain broth the normal streptococcic morphology only is observed. Although the ring forms are abundant in stained smears, when the same cultures are diluted we have not been able to find them in wet preparations where single cell isolation might be performed. Therefore, we can not state that these forms are actual phases of the organism.

That the ring forms are not artefacts is suggested by the fact that they are not seen in control cultures grown in plain broth nor in cultures of other organisms in lithium chloride broth nor in smears of the sterile lithium broth alone. On the other hand, the variability in size of the rings, often seen on the same slide (Figs. 12, 13, and 14 are photomicrographs of different areas of the same smear), the fact that they can not be made out readily in wet preparations, and the fact that they can not be reproduced by transfers are in opposition to the view that they are living phases of the streptococcus.

SUMMARY

1. Lithium chloride broth is a suitable medium for the production of pleomorphism in many bacterial species.
2. Streptococcus, because of its chain formation, lends itself readily to the study of the fusion of individual bacteria.
3. Certain ring forms in streptococcus and staphylococcus broth cultures are described. The significance of these forms is not known.

REFERENCES

- (1) Almquist, E.: Wuchsformen. Fructification und Variation der Typhus-bacterie. *Ztschr. f. Hyg. u. Infektionskr.* (1917), vol. 83, 1.
- (2) Enderlein, G.: Bakterien Cyclogenie. Walter de Gruyter & Co., Berlin u. Leipzig. (1925.)
- (3) Lohnis and Smith: *Jour. Agr. Res.* (1916), vol. VI, No. 18, pp. 675-701.
- (4) Hort, E. C.: The life history of bacteria. *Brit. Med. Jour.* May 5, 1917, pp. 571-575.
- (5) Mellon, R. R.: Studies in microbic heredity. *Jour. Bact.* (1925), vol. X, No. 5, September, pp. 481-501.
- (6) Hadley, Delves, and Klimek: The filtrable forms of bacteria. *Jour. Inf. Dis* (1931), vol. 48, pp. 1-159.
- (7) Kuhn: *Centralbl. f. Bakteriologie*. (1924), vol. 93, p. 280.
- (8) Gray, J. O. A.: *Jour. Path. & Bact.* (1931), vol. XXIV, pp. 335-342.

CALCIUM, PHOSPHORUS, AND PROTEIN METABOLISM IN LEPROSY

A Study of the Total Calcium, Diffusible and Nondiffusible Calcium, Phosphorus, Total Proteins, Albumin, and Globulin in the Blood Serum

By JERALD G. WOOLEY, *Acting Assistant Surgeon*, and HILARY ROSS, *Druggist*,
United States Public Health Service, United States Marine Hospital (National Leprosarium), Carville, La.

The growing interest in disturbances of calcium metabolism within recent years has stimulated investigations of the state of calcium in blood serum and its distribution in various body fluids. It is generally considered at the present time that calcium exists in the serum; first, in the ionic form (although the amount ionized is not definitely known); second, as undissociated molecules in equilibrium with the ions; and third, in nonionizable combination with organic constituents. The quantity in the blood serum of the first two forms, termed "diffusible calcium," seems to indicate that this form rather than the total calcium is the better index of the physiologically active or available calcium (1). The last form, termed "nondiffusible," is looked upon as a calcium-protein combination; and while little is known regarding its real nature, the function of this portion may have its own special uses.

Loeb (2) in his interesting work on the Proteins and Theory of Colloidal Behavior, shows the possible existence of compounds of calcium and protein, since proteins at a hydrogen-ion concentration

above their isoelectric point (namely, more alkaline) form compounds with monovalent and divalent cations.

In an investigation of the state of calcium in the blood sera of lepers we (3) found in 53 cases examined, a diminution in the diffusible form and rather a high concentration in the nondiffusible form, although the total content was within physiologic limits. Bones of the hands and feet of 48 of the 53 patients were examined by X ray, and it was found that 44 had atrophy either in the form of decalcification or bone absorption to some degree.

In disease, certain changes in the serum proteins have long been recognized. Changes in the ratio of albumin to globulin have been especially studied. Morse (4) states in substance that, besides nephritis, other diseases exhibit differences in the ratio of globulin to total protein and to albumin, infections and toxemias causing a typical rise in the proportion of globulin, and that an increase in the proportion of globulin to albumin indicates aggravation of the disease.

Peters and Eiserson (5) state: "Salvesen and Linder, in 1923, from a study of the relation of calcium to protein in sera and transudates from patients with nephritis, concluded that the amount of protein in body media also had an important influence upon the concentration of calcium in these media. Since then, Marrack and Thacker have shown that proteins increase the solubility of calcium in true and artificial sera, probably by the formation of un-ionized or only slightly ionized calcium-protein complexes."

Since leprosy is a chronic infectious disease producing pathological changes in many tissues of the body, bones, peripheral nerves, etc., we desired to carry on experiments to see whether there was any regular relationship between the total serum protein, albumin and globulin fractions, diffusible and nondiffusible calcium, and phosphorus in the blood serum in leprosy, or whether an increase in globulin was merely related to the degree of infection and intoxication or that of tissue destruction, independent of the calcium metabolism.

The forty-six patients selected were of various types, nationalities, duration of leprosy, and state of progression, and their sera were analyzed for total calcium, diffusible calcium, inorganic phosphorus, total proteins, albumin and globulin, and the complement fixation.

Due to the various results obtained by different investigators for albumin and globulin which were probably due to variations in the method used, we analyzed concurrently the sera of six young men, physicians who had recently passed rigid physical examinations for entrance into the United States Public Health Service.

ANALYTICAL METHODS

Approximately 20 cubic centimeters of blood was collected for analysis from a cubital vein. The blood was allowed to clot and was centrifuged and the serum was removed from three to four hours after

the specimen had been taken and was preserved at a temperature of 6° to 8° C. The serum for diffusible calcium was dialyzed within 24 hours. The protein determinations were made within 48 hours, and the other analyses were completed within a week.

The total calcium determinations were made on the serum by Clark-Collip modification of the Kramer-Tisdall method (6); diffusible calcium by a negative pressure filtration described by Moritz (7), the filtrate being tested according to the method of Burk and Greenberg (8) to determine any leakage of protein material through the sac; phosphorus according to the method of Benedict and Theiss (9); total proteins by a micro-Kjeldahl method; albumin by Howe (quoted by Hawk) (10); globulin by subtracting the albumin from the total protein; the complement fixation by Kolmer's quantitative method, run in parallel with Kahn's precipitation test.

TABLE 1.—*Determination for controls*

Control	Protein	Albumin	Globulin	Ratio, albumin globulin	Calcium, total, mg. per 100 c. c. serum	Diffusible calcium, mg. per 100 c. c. serum	Diffusible calcium	Calcium, nondiffusible, mg. per 100 c. c. serum	Phosphorus, mg. per 100 c. c. serum
	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>				<i>Per cent</i>		
JGW.....	7.18	5.50	1.68	1:3.2	10.5	5.4	51.4	5.1	3.0
JGH.....	6.56	4.90	1.66	1:2.0	10.5	5.3	50.4	5.2	4.2
DWN.....	7.81	5.50	2.31	1:2.3	10	5.5	55.0	4.5	3.4
EJR.....	7.18	5.18	2.00	1:2.5	9.8	5.4	56.1	4.4	3.8
ROG.....	8.12	5.84	2.28	1:2.5	10.9	5.3	48.5	5.6	4.1
WEA.....	7.18	4.90	2.28	1:2.1	11	5.5	50.0	5.5	3.8
Minimum.....	6.56	4.90	1.66	1:2.1	9.8	5.3	48.5	4.4	3.0
Average.....	7.84	5.30	2.08	1:2.6	10.4	5.4	51.9	5	3.7
Maximum.....	8.12	5.84	2.31	1:3.2	11	5.5	56.1	5.6	4.2

The normal figures for total protein as given by different investigators have been uniform, 6 to 8 per cent, though the limits for normal values for serum albumin and globulin appear to be fairly wide. The subject of the serum proteins in man has been carefully considered by Rowe (11), who employed the microrefractometric method of Robertson. Rowe found, in a series of 22 normal cases, the serum albumin to vary between 4.6 and 6.7 per cent; the serum globulin between 1.2 and 2.3 per cent; the total serum proteins between 6.5 and 8.2 per cent. The percentage of globulin varies from 16 to 32. Our figures in the controls (Table 1) are comparable with those of Rowe.

The average figures for total calcium, diffusible calcium, and phosphorus agree with our findings in a previous report (3) and with those of other investigators (7) (12).

The data which have been obtained on the blood sera of lepers have been divided into two main groups. The first group includes those cases which show a diffusible calcium content of 50 per cent and over (Table 2); the second group includes cases showing a diffusible calcium content of less than 50 per cent (Table 3).

TABLE 2.—Patients showing a diffusible calcium of 50 per cent and over

No.	Race	Sex	Age	Approximate duration of leprosy	Type	Stage of progression ¹	Activity ²	Proteins	Albumin	Globulin	Ratio, albumin globulin	Calcium, total, mg. per 100 c. c. serum	Calcium, diffusible, mg. per 100 c. c. serum	Diffusible calcium	Nondiffusible calcium, mg. per 100 c. c. serum	Phosphorus, mg. per 100 c. c. serum	Comple- ment fixation
			Years	Years				Per cent	Per cent	Percent				Per cent			
684	White	M	21	6	Mixed	A. M. A.	Retg.	7.81	5.93	1.88	1:3.1	9.3	5.0	53.6	4.3	4.1	Positive.
683	White	M	24	8	Mixed	A. M. A.	Imp.	6.20	4.25	1.95	1:2.1	10	5.6	56.0	4.4	3.8	Negative.
643	White	F	22	6	Nodular	I. E.	Susy	7.15	5.15	2.00	1:2.5	9.9	5.0	50.5	4.9	3.4	Negative.
539	White	M	31	19	Mixed	A. M. A.	Imp.	8.71	4.37	4.34	1:1.0	8.7	4.9	56.3	3.8	3.5	Negative.
538	White	M	19	12	Nodular	A. F. A.	Retg.	7.81	3.12	4.69	1:0.6	11	6.2	53.3	4.8	4.1	Negative.
474	Chinese	M	32	7	Mixed	A. F. A.	Imp.	6.25	3.58	2.67	1:1.3	9.7	5.3	53.6	4.5	3.3	Negative.
718	White	M	43	13	Anesthetic	I. M. A.	Susy	7.81	4.68	3.13	1:1.5	9.5	5.0	52.6	4.5	2.4	Positive.
462	White	F	47	12	Mixed	A. M. A.	Imp.	8.96	5.25	3.71	1:1.4	10.6	5.9	55.6	4.7	4.5	Positive.
672	Mexican	M	38	2	Mixed	I. E.	Susy	8.34	5.18	3.16	1:1.6	10.4	5.2	50.9	5.2	3.0	Positive.
477	Greek	M	37	8	Mixed	A. M. A.	Imp.	6.56	4.25	2.31	1:1.8	10.8	5.8	53.7	5.0	3.0	Negative.
526	White	M	32	6	Mixed	A. E.	Imp.	6.25	4.02	2.23	1:1.8	10.5	6.3	50.0	4.7	2.6	Negative.
722	Negro	F	22	8	Mixed	A. M. A.	Susy	7.18	4.06	3.12	1:1.3	10	5.3	53.7	5.0	3.3	Negative.
720	White	F	22	8	Mixed	A. E.	Imp.	7.81	4.06	3.75	1:1.0	10.6	5.6	53.7	5.0	3.3	Negative.
707	White	F	36	9	Anesthetic	A. E.	Susy	7.81	5.18	2.63	1:1.9	10	5.6	56.0	4.4	1.7	Negative.
	Minimum							6.20	3.12	1.86	1:0.6	8.7	4.9	50.0	3.8	1.7	
	Average							7.47	4.50	2.97	1:1.5	10	5.4	54.0	4.6	3.2	
	Maximum							8.96	5.93	4.69	1:3.1	11	6.3	60.0	5.2	4.5	

¹ A. M. A. = Active, moderately advanced.

A. F. A. = Active, far advanced.

I. M. A. = Inactive, moderately advanced.

I. E. = Inactive, early.

A. E. = Active, early.

Retg. = Retrograding.

Susy = Stagnant.

Imp. = Improving.

² Months.

TABLE 3.—Patients showing a diffusible calcium of less than 50 per cent

No.	Race	Sex	Age	Approximate duration of leprosy	Type	Stage of progression ¹	Activity ²	Proteins	Albumin	Globulin	Ratio albumin globulin	Calcium, total, mg. per 100 c. c. serum	Calcium, diffusible, mg. per 100 c. c. serum	Diffusible calcium	Nondiffusible calcium, mg. per 100 c. c. serum	Phosphorus, mg. per 100 c. c. serum	Completion
			Years					Per cent	Per cent	Per cent			Per cent				
115	White	M	23	11	Nodular	A. M. A.	Relg.	7.81	3.12	4.69	1:0.6	10.7	4.4	41.1	6.3	3.8	Negative.
234	White	F	32	16	Mixed	A. M. A.	Relg.	7.81	2.80	5.01	1:0.6	15.0	5.1	34.0	9.9	7.1	Positive.
8	Negro	M	45	10	Nodular	A. M. A.	Relg.	7.81	4.06	3.75	1:1.0	10.5	4.6	43.8	9.9	3.3	Positive.
46	White	F	40	17	Anesthetic	A. F. A.	Relg.	10.81	4.68	5.63	1:0.8	10.6	4.2	39.6	6.4	2.9	Positive.
156	Chinese	M	37	17	Nodular	A. F. A.	Relg.	8.75	4.76	3.99	1:1.2	11.0	4.2	38.1	6.8	2.9	Positive.
265	Negro	M	81	13	Nodular	A. F. A.	Relg.	8.75	4.68	4.07	1:1.0	10.8	5.0	46.2	5.8	2.8	Positive.
300	White	M	41	14	Nodular	A. M. A.	Relg.	7.18	4.06	3.12	1:1.3	10.6	4.8	45.2	5.8	2.6	Positive.
161	Japanese	M	34	9	Mixed	A. M. A.	Imp.	7.81	3.75	4.06	1:1.0	10.8	4.5	45.0	6.1	4.6	Positive.
591	White	F	48	9	Mixed	A. M. A.	Imp.	6.56	3.12	3.44	1:0.9	10.8	4.7	43.5	6.1	4.6	Positive.
431	Negro	M	33	7	Mixed	A. M. A.	Relg.	7.00	3.12	3.44	1:0.9	10.8	4.7	43.5	6.1	4.6	Positive.
594	White	M	55	4	Mixed	A. F. A.	Relg.	7.18	3.43	3.75	1:0.8	10.6	4.4	41.5	7.3	2.0	Negative.
717	White	M	67	2	Mixed	A. M. A.	Relg.	6.25	3.25	3.00	1:1.0	12.1	4.9	40.4	6.2	2.6	Positive.
516	Mexican	M	60	9	Mixed	A. M. A.	Relg.	7.45	3.25	3.00	1:1.1	11.6	5.1	43.9	6.5	2.6	Positive.
294	White	M	35	14	Mixed	A. F. A.	Relg.	7.18	3.75	3.43	1:1.1	10.5	4.7	44.7	6.0	3.7	Positive.
608	White	M	31	14	Mixed	A. M. A.	Relg.	7.18	3.90	3.28	1:1.1	10.5	4.7	44.7	5.8	3.5	Positive.
307	Jew	M	44	19	Mixed	I. E.	Imp.	7.81	4.15	3.75	1:1.1	10.6	4.1	38.6	6.5	3.5	Positive.
610	White	M	24	13	Mixed	I. E.	Imp.	7.18	3.43	3.75	1:1.1	11.0	4.8	45.4	6.2	2.5	Negative.
209	White	M	44	17	Nodular	A. M. A.	Relg.	11.56	4.06	6.76	1:0.7	11.0	5.0	45.0	6.0	2.5	Negative.
665	White	M	26	3	Mixed	A. M. A.	Relg.	6.99	4.46	2.93	1:1.8	16.0	4.5	45.0	5.6	2.9	Negative.
426	White	M	30	15	Mixed	A. F. A.	Relg.	8.43	4.46	3.97	1:1.1	10.0	4.7	47.0	5.3	2.9	Negative.
670	Mexican	M	16	2	Mixed	A. M. A.	Relg.	8.18	4.65	3.53	1:1.3	9.4	4.0	42.4	5.4	2.8	Positive.
680	Negro	F	23	2	Mixed	A. M. A.	Relg.	6.56	4.10	2.46	1:1.6	11.5	4.6	41.8	6.4	3.3	Positive.
667	White	M	70	7	Mixed	A. M. A.	Imp.	7.62	4.37	3.25	1:1.5	11.0	4.5	45.0	5.5	3.5	Positive.
681	Mexican	M	28	3	Nodular	A. M. A.	Imp.	7.18	3.57	2.81	1:1.4	10.7	4.7	43.0	5.0	3.6	Positive.
679	White	F	41	8	Mixed	A. M. A.	Relg.	6.56	3.75	2.69	1:1.5	9.8	4.8	46.2	5.2	4.1	Negative.
682	White	F	42	18	Mixed	A. F. A.	Relg.	6.25	3.53	2.50	1:1.6	10.6	4.8	46.0	5.7	3.0	Negative.
456	White	F	84	15	Anesthetic	I. F. A.	Relg.	9.62	5.93	3.69	1:1.6	10.6	4.8	46.0	5.7	3.1	Positive.
668	Mexican	M	71	11	Mixed	A. M. A.	Relg.	7.62	4.65	2.97	1:1.5	10.9	4.8	46.0	5.3	3.3	Positive.
674	White	M	73	4	Mixed	A. M. A.	Relg.	7.30	4.65	2.65	1:1.7	10.1	4.8	47.5	5.3	3.3	Positive.
439	White	M	34	10	Mixed	A. M. A.	Imp.	6.56	4.25	2.31	1:2.0	10.5	4.7	44.7	5.8	3.1	Positive.
673	White	M	23	2	Mixed	I. E.	Imp.	6.99	4.68	2.31	1:2.0	10.5	4.7	44.7	5.8	3.1	Positive.
713	Chinese	M	33	3	Mixed	A. M. A.	Relg.	6.65	3.22	3.43	1:0.9	10.8	5.2	48.1	5.6	3.1	Positive.
Minimum								6.25	2.80	2.31	1:0.9	9.3	4.0	34	5.0	2.3	
Average								7.62	4.06	2.97	1:1.1	10.7	4.6	43.1	6.1	2.4	
Maximum								11.56	5.93	6.76	1:2.0	16	5.2	48.1	9.9	7.1	

¹ A. M. A. = Active, moderately advanced.
 A. F. A. = Active, far advanced.
 I. M. A. = Inactive, moderately advanced.
 I. E. = Inactive, early.
 A. E. = Active, early.

² Relg. = Retrograding.
 Stny. = Stationary.
 Imp. = Improving.

The 46 patients represent the following types and stages of progression:

Stage	Type			Total
	Nodular	Mixed	Anes- thetic	
Inactive, early.....	1	4	—	5
Inactive, moderately advanced.....	1	1	2	4
Active, early.....	1	2	1	4
Active, moderately advanced.....	4	21	—	25
Active, far advanced.....	2	5	1	8
Total.....	9	33	4	46

The results of Table 2 show that the 14 patients had an approximately normal total calcium and inorganic phosphorus as compared with the controls, with the exception of case No. 707, which shows an inorganic phosphorus content of 1.7 milligrams which is a little low; and case No. 569 showing a total calcium of 8.7 milligrams. The average findings in this series for diffusible calcium were within the normal range, though 6 of the cases were slightly below normal. Of these, 2 were 5.2 milligrams, 3 were 5 milligrams, and 1 was 4.9 milligrams.

In contrast to the constancy of the total protein values, which are all within the normal range of our controls, except in cases Nos. 462 and 569, which are slightly above normal, showing 8.96 and 8.71 per cent, we find in eight cases the globulins increased, with a lowered albumin-globulin ratio. Five of these cases show a negative Wassermann; three were positive. Three cases of the 14 show normal values on all determinations.

The average albumin-globulin ratio on the 14 cases was 1:1.5, as against 1:2.6 of our controls, the lowest ratio being 1:0.6 and the highest 1:3.1, as against 1:2.1 lowest and 1:3.2 highest in the controls.

Seven patients show improvement, 5 are stationary, and 2 show retrogression.

The results presented in Table 3 show that 32 of the 46 patients had a low diffusible calcium, averaging 4.6 milligrams, as against 5.4 milligrams of the controls. The total calcium and total inorganic phosphorus were within physiologic limits in 30 cases; 2 cases showed a high total calcium, No. 234, 15 milligrams, and No. 717, 12.1 milligrams, while case No. 234 also showed a high inorganic phosphorus content of 7.1 milligrams.

It will be noted that in practically all instances the total protein values were within normal limits, with the exception of cases 46, 456, 209, 156, and 265, which showed, respectively, 10.31, 9.62, 11.56, 8.75

and 8.75 per cent. The relationship between albumin and globulin was markedly disturbed. There was a more striking increase in the globulins than in those cases approaching a normal diffusible calcium (Table 2); cases 439 and 673 were the only two within the normal range, showing 2.31 per cent. The albumin-globulin ratio was lower than in the patients having a diffusible calcium content over 50 per cent, averaging 1:1.1, as against 1:1.5. (Table 2.)

Of the 32 cases, none showed normal values throughout all the determinations. Fourteen patients showed retrogression, 9 were stationary, and 9 showed improvement. Nineteen cases showed a positive Wassermann, 11 were negative, and 2 cases were not determined.

In the entire series (Tables 2 and 3) the average findings of inorganic phosphorus, total calcium, and total proteins were well within the normal range except in those cases previously mentioned. (Cases 46, 456, and 209 had a high total protein, and cases 462, 569, 156, and 265 were slightly above normal; cases 234 and 717 had a high calcium content; case 569 had a low calcium content; and case 234 had a high inorganic phosphorus content.)

A very wide range of diffusible calcium was found in the patients' sera; the largest quantity was 6.3 milligrams, while the smallest was 4.0 milligrams per 100 cubic centimeters of serum. The per cent of calcium that was diffusible ranged between 34 and 60. The non-diffusible calcium ranged between 3.8 milligrams and 9.9 milligrams per 100 cubic centimeters of serum.

In the controls the quantity of diffusible calcium ranged between 5.3 milligrams and 5.5 milligrams per 100 cubic centimeters of serum, and the per cent of diffusible calcium was between 48.5 and 56.1. The nondiffusible calcium ranged between 4.4 milligrams and 5.6 milligrams per 100 cubic centimeters of serum.

The globulins and albumin-globulin ratio fluctuated within comparatively wide limits in the patients' sera, the globulins ranging from 1.88 to 6.76 per cent. The albumin-globulin ratio was between 1:0.5 and 1:3.1. In the controls the globulins ranged from 1.66 to 2.31 per cent, and the albumin-globulin ratio from 1:2.1 to 1:3.2.

Of the Wassermanns, 23 were negative, 20 positive, and 3 were not determined.

The duration of leprosy ranged from 8 months to 19 years.

TABLE 4.—*Stage of activity values taken from Tables 2 and 3*

	Pro- teins, per cent	Albu- min, per cent	Globu- lin, per cent	Ratio, albumin globulin	Calcium, total, mg. per 100 c. c. serum	Calcium, diffusible, mg. per 100 c. c. serum	Diffusi- ble cal- cium, per cent	Nondif- fusible calcium, mg. per 100 c. c. serum	Phos- phorus, mg. per 100 c. c. serum
16 PATIENTS SHOWING IMPROVEMENT									
Minimum-----	6.20	3.43	1.95	1:0.9	8.7	4.1	38.6	3.8	2.6
Average-----	7.27	4.20	3.06	1:1.3	10.3	5.0	48.5	5.3	3.2
Maximum-----	8.96	5.25	4.34	1:2.1	11.0	6.3	60.0	6.5	4.5
14 PATIENTS THAT ARE STATIONARY									
Minimum-----	6.56	3.12	2.00	1:0.7	9.4	4.0	34.8	4.4	1.7
Average-----	8.50	4.80	3.71	1:1.2	10.4	4.8	46.1	5.4	3.1
Maximum-----	11.56	5.93	6.76	1:2.5	11.5	5.6	56.0	7.5	4.6
16 PATIENTS SHOWING RETROGRESSION									
Minimum-----	6.25	2.80	1.88	1:0.5	9.3	4.2	34.0	4.3	2.3
Average-----	7.71	3.96	3.75	1:1.0	10.9	4.7	43.1	6.2	3.5
Maximum-----	10.81	5.93	5.63	1:3.1	12.1	6.2	56.3	9.9	7.1

Table 4 gives the minimum, average, and maximum findings in the patients showing improvement, remaining stationary, and showing retrogression. The results show variations between the groups into which the cases have been divided. In the lepers showing retrogression the average findings reveal an abnormally low albumin-globulin ratio, with a corresponding decrease in the percentage of diffusible calcium. In the cases that are stationary, the average albumin-globulin ratio is higher, as is also the diffusible calcium. In those cases showing improvement the average albumin-globulin ratio and diffusible calcium were found to be highest.

In general, it appeared that clinical improvement was coincident with a decrease in globulins and the nondiffusible calcium, with an increase in the diffusible calcium and a higher albumin-globulin ratio. The globulins were higher and the diffusible calcium and albumin-globulin ratio were lowest in severe cases, or in those showing retrogression.

DISCUSSION

Many theories have been advanced by various investigators, but few agree as to the cause of muscular and bone changes in leprosy; all are of the opinion, however, that the constant inflammation and infiltration of nerves interfere with nerve function. This appears logical; but, too, our results would seem to show that this constant inflammation, lack of nerve function, muscular and bone changes, may be due in part to a lack of transference to the tissues, of the functionally available and diffusible calcium, which we have found

deficient in the blood sera of lepers. It is thought that probably the disturbance in the protein balance which we have found by our analysis may in some way affect the degree of diffusibility of the available calcium. It seems evident that clinical manifestations of disordered cell function may result from such abnormalities of cell permeability, which may be dependent upon deviations from the normal balance of calcium ions in the blood and tissue.

The consensus of opinion is that the proteins combine with the calcium to form an un-ionized calcium-protein complex. The question may arise as to which constituent of the serum forms the calcium complex. From our results in leprosy, it would seem that the serum globulin bears some relation to the nondiffusible calcium, since in many of the cases we find, first, a rather high nondiffusible calcium with a high serum globulin and a decrease in the diffusible calcium, and, second, a low nondiffusible calcium with a low serum globulin, and a higher diffusible calcium.

It was found, too, that, according to the stage of activity, in those cases showing an improvement the serum globulin and nondiffusible calcium were lower than in those cases showing retrogression. It would seem from these results that the calcium is bound with the serum globulin as infection increases, to form nonavailable calcium. However, these results should not be construed as demonstrating that all of the nondiffusible calcium is bound to the serum globulin, as the physicochemical system of the blood stream is a complex one, and the conditions existing locally in the tissues must be thoroughly understood before we can have a complete knowledge of the mechanism of the so-called mineral balance in the living organism. It is thought, however, that our results would justify further investigation.

SUMMARY

Sera from six normal, healthy young men were examined for total proteins, albumin, globulin, total calcium, diffusible calcium, the per cent of calcium that was diffusible, the nondiffusible calcium, the albumin-globulin ratio, and inorganic phosphorus. Sera from 46 lepers, representing the various types and stages of progression of the disease, were similarly examined, including the use of the complement-fixation test.

The albumin-globulin ratio and the diffusible calcium, as well as the percentage of diffusible calcium, averaged considerably lower in the lepers than in the normal young men; the globulins and nondiffusible calcium averaged higher than in the controls. Three cases showed normal values throughout all determinations as compared with our controls.

A consideration of the results indicates that certain definite changes in the serum proteins and calcium metabolism exist in leprosy, and

suggests that clinical improvement is generally accompanied by a decrease in the percentage of globulin and the nondiffusible calcium, with a corresponding increase in the diffusible calcium and albumin-globulin ratio.

REFERENCES

- (1) Stewart, C. P., and Percival, G. H.: Calcium Metabolism. *Physiological Review*, **8**, 283, July, 1928.
- (2) Loeb, Jaques: *Proteins and Theory of Colloidal Behavior*, ch. 2. McGraw-Hill, 1922.
- (3) Wooley, J. G., and Ross, Hilary: Phosphorus, Total Calcium, and Diffusible Calcium Content of the Blood Sera of Lepers and Their Relation to Bone Changes. *Pub. Health Rep.*, **46**, 641-658 (March 20, 1931).
- (4) Morse, Withrow: *Applied Biochemistry*, 2d ed., pp. 225 and 761. Saunders.
- (5) Peters, J. P., and Eiserson, L.: The Influence of Protein and Inorganic Phosphorus on Serum Calcium. *Jour. Biol. Chem.*, **84**, 155, 1929.
- (6) Clark, E. P., and Collip, J. B.: A Study of the Tisdall Method for the Determination of Blood Calcium, with a Suggested Modification. *Jour. Biol. Chem.*, **63**, 461, 1925.
- (7) Moritz, Alan R.: The Effect of Ultra Violet Irradiation on the State of Serum Calcium. *Jour. Biol. Chem.*, **64**, 81-89 (1925).
- (8) Burk, N. F., and Greenberg, D. M.: The Physical Chemistry of the Proteins in Nonaqueous and Mixed Solvents. *Jour. Biol. Chem.*, **87**, June, 1930.
- (9) Benedict, Stanley R., and Theiss, R. C., *Jour. Biol. Chem.*, **61**, 63-66 (1924).
- (10) Hawk, P. B., and Bergeim, Olaf: *Practical Physiological Chemistry*, 9th ed., Blakiston, 1926.
- (11) Rowe, A. H.: The Albumin and Globulin Content of Human Blood Serum in Health, Syphilis, Pneumonia, and Certain Other Infections, with the Bearing of Globulin on the Wassermann Reaction. Cited by Myers, in *Practical Chemical Analysis of Blood*, 2d ed., rev., London, 1924. Klimpton & Wace.
- (12) Updegraff, H., Greenberg, D. M., and Clark, G. W.: A Study of the Distribution of the Diffusible and Nondiffusible Calcium in the Blood Sera of Normal Animals. *Jour. Biol. Chem.*, **71**, 87 (1926).

COURT DECISION RELATING TO PUBLIC HEALTH

Milk laws construed.—(Massachusetts Supreme Judicial Court; *Commonwealth v. Rapoza*, 178 N. E. 530; decided Dec. 2, 1931.) General Laws, ch. 94, sec. 19, provided in part as follows:

No person, himself or by his servant or agent, shall sell, exchange, or deliver, or have in his custody or possession with intent so to do, or expose or offer for sale or exchange * * * milk from which the cream or a part thereof has been removed. * * *

A penalty was provided for violation. The defendant was found guilty under this section of possessing, with intent to sell as pure milk, milk from which a portion of the cream had been removed. It was his contention that he could not properly be convicted because

he had not received the notice required by General Laws, ch. 94, sec. 37. Such section read, in part, as follows:

No producer of milk shall be liable to prosecution for the reason that the milk produced by him is not of good standard quality * * * unless he shall fail to bring the milk produced by him to the legal standard for milk solids and milk fat within 20 days after written notice that it is below said standard has been sent to him by the officer taking said sample. * * *

In rejecting the defendant's contention, the supreme court pointed out that the offense charged in the instant case was not the failure to produce milk of standard quality but the removal of cream therefrom, and stated that it was apparent that section 37 referred to an entirely distinct and different offense from that set forth in section 19. Section 37 was held not to apply to a case where milk had been watered or where the cream had been removed, a difference being recognized between milk naturally deficient and milk made deficient by dilution. "It is obvious," said the court, "that section 37 has no application to section 19, which refers to a case where milk has been tampered with by adding water or any foreign substance or from which cream has been removed."

DEATHS DURING WEEK ENDED JANUARY 23, 1932

Summary of information received by telegraph from industrial insurance companies for the week ended January 23, 1932, and corresponding week of 1931. (From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce)

	Week ended Jan. 23, 1932	Correspond- ing week, 1931
Policies in force.....	74, 199, 865	75, 130, 099
Number of death claims.....	15, 011	15, 115
Death claims per 1,000 policies in force, annual rate..	10. 6	10. 5
Death claims per 1,000 policies, first 3 weeks of year, annual rate.....	10. 1	11. 0

Deaths¹ from all causes in certain large cities of the United States during the week ended January 23, 1932, infant mortality, annual death rate, and comparison with corresponding week of 1931. (From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce)

[The rates published in this summary are based upon mid-year population estimates derived from the 1930 census]

City	Week ended Jan. 23, 1932				Corresponding week, 1931		Death rate ² for the first 3 weeks	
	Total deaths	Death rate ²	Deaths under 1 year	Infant mortality rate ²	Death rate ²	Deaths under 1 year	1932	1931
Total (83 cities)	8,004	11.5	620	52	14.5	862	12.2	14.2
Akron	40	7.9	5	62	7.9	6	9.1	8.5
Albany ³	33	13.2	1	20	14.5	3	15.5	15.5
Atlanta ⁴	72	13.3	7	68	13.9	12	15.9	15.3
White	39	10.9	3	44	11.9	6	12.0	13.0
Colored	33	18.0	4	115	17.9	6	23.7	19.8
Baltimore ⁵	241	15.4	17	60	15.9	13	15.0	15.3
White	188	14.7	13	59	15.0	7	14.2	14.2
Colored	53	18.4	4	64	19.9	6	18.4	19.9
Birmingham ⁶	50	9.4	2	21	15.9	2	12.1	15.0
White	15	4.6	0	0	14.1	2	8.6	11.1
Colored	35	17.4	2	54	18.8	0	17.7	21.5
Boston	215	14.3	21	63	17.9	18	15.3	16.4
Bridgeport	40	14.2	3	53	13.1	1	13.8	13.9
Buffalo	143	12.7	11	53	14.4	20	13.3	14.2
Cambridge	26	11.9	3	62	13.7	3	14.9	12.9
Camden	39	17.1	7	123	17.1	5	15.6	16.4
Canton	20	9.7	4	100	11.7	2	10.6	11.4
Chicago ⁷	646	9.6	56	55	11.6	73	10.7	11.3
Cincinnati	141	16.0	10	64	15.5	16	15.7	18.8
Cleveland	190	10.8	16	52	10.4	20	11.3	11.1
Columbus	81	14.1	5	50	14.1	5	15.8	14.2
Dallas ⁸	60	11.1	5	-----	13.6	6	11.4	13.7
White	51	11.4	4	-----	11.8	4	10.4	12.6
Colored	9	9.7	1	-----	22.0	2	16.5	19.1
Dayton	49	10.8	3	43	11.9	7	11.2	13.1
Denver	89	15.8	3	29	16.6	7	19.8	16.9
Des Moines	22	7.9	0	0	13.0	4	10.1	13.2
Detroit	269	8.2	30	54	8.3	22	8.5	8.6
Duluth	26	10.3	0	0	14.3	1	9.4	13.8
El Paso	35	17.1	7	-----	22.8	10	16.0	22.2
Erie	19	8.3	1	21	12.8	2	10.5	11.8
Fall River ⁹	26	11.8	3	80	10.0	5	12.4	12.5
Flint	25	7.7	2	29	8.6	4	7.5	8.0
Fort Worth ¹⁰	29	8.9	0	-----	12.1	6	10.5	13.2
White	25	9.1	0	-----	11.5	6	9.3	12.1
Colored	4	7.8	0	-----	15.3	0	17.0	18.5
Grand Rapids	17	5.1	1	17	12.1	10	7.0	10.0
Houston ¹¹	72	11.6	10	-----	12.8	8	11.7	12.8
White	57	12.5	9	-----	9.9	7	10.8	12.1
Colored	15	9.1	1	-----	20.7	1	14.2	14.9
Indianapolis ¹²	117	16.3	8	65	12.8	4	14.5	14.2
White	101	16.1	8	74	12.4	4	13.9	13.7
Colored	16	18.1	0	0	16.2	0	18.9	18.1
Jersey City	58	9.5	4	33	16.8	12	11.0	13.8
Kansas City, Kans. ¹³	29	12.2	3	66	16.5	4	13.5	16.1
White	19	9.9	2	54	14.2	3	12.2	14.3
Colored	10	22.1	1	128	26.6	1	19.1	23.7
Kansas City, Mo.	116	14.6	11	124	13.6	10	11.8	14.6
Knoxville ¹⁴	27	12.6	1	25	17.7	3	12.0	16.2
White	22	12.3	1	28	15.4	3	11.2	14.3
Colored	5	14.3	0	0	29.3	0	16.2	26.4
Long Beach	34	11.0	1	26	11.3	2	11.1	10.8
Los Angeles	343	13.0	11	33	12.9	30	12.9	13.7
Louisville ¹⁵	75	12.7	9	82	18.1	3	14.6	20.0
White	54	10.8	5	52	14.4	2	13.1	17.6
Colored	21	23.0	4	298	38.3	1	22.6	32.8
Lowell ¹⁶	26	13.6	3	78	18.7	4	13.9	15.1
Lynn	17	8.6	0	0	11.2	1	11.2	13.5
Memphis ¹⁷	92	18.3	13	142	20.3	20	17.9	18.0
White	46	14.8	5	85	17.6	9	13.3	15.7
Colored	46	23.9	8	241	24.8	11	25.4	21.8
Miami ¹⁸	35	16.1	2	56	9.3	1	15.0	11.8
White	23	13.6	1	39	7.2	0	13.8	11.4
Colored	12	24.8	1	101	16.5	1	19.3	11.0

See footnotes at end of table.

Deaths¹ from all causes in certain large cities of the United States during the week ended January 23, 1932, infant mortality, annual death rate, and comparison with corresponding week of 1931—Continued

City	Week ended Jan. 23, 1932				Corresponding week, 1931		Death rate ² for the first 3 weeks	
	Total deaths	Death rate ²	Deaths under 1 year	Infant mortality rate ³	Death rate ²	Deaths under 1 year	1932	1931
Milwaukee.....	106	9.2	7	33	10.3	16	9.6	10.3
Minneapolis.....	80	8.7	7	46	12.0	15	9.3	12.5
Nashville ⁴	26	12.0	3	45	15.1	4	13.1	16.5
White.....	26	11.9	3	59	13.0	3	12.8	14.2
Colored.....	10	12.2	0	0	20.7	1	13.8	22.7
New Bedford ⁷	25	11.6	2	58	12.0	4	12.1	13.3
New Haven.....	132	11.2	4	80	16.3	3	13.2	13.6
New Orleans ⁴	132	14.5	11	63	20.7	14	15.6	21.2
White.....	81	12.6	5	44	16.9	8	13.4	17.7
Colored.....	51	19.4	6	98	32.5	6	21.2	29.7
New York.....	1,385	10.0	123	55	16.5	176	11.0	15.4
Bronx Borough.....	203	7.7	14	40	12.3	28	8.5	11.0
Brooklyn Borough.....	461	9.0	44	49	15.4	68	9.8	14.6
Manhattan Borough.....	533	15.7	50	71	24.6	58	16.9	23.3
Queens Borough.....	145	6.3	12	50	11.3	21	7.1	10.3
Richmond Borough.....	43	13.4	3	59	14.7	1	14.9	14.5
Newark, N. J.....	75	8.7	6	33	13.6	8	10.4	13.3
Oakland.....	62	10.8	2	25	12.1	7	11.8	13.7
Oklahoma City.....	44	11.2	9	123	11.4	7	11.1	11.9
Omaha.....	50	11.9	4	45	13.5	4	13.4	14.3
Paterson.....	41	15.4	5	91	12.4	2	15.4	14.3
Peoria.....	23	10.8	0	0	15.4	2	11.3	16.4
Philadelphia.....	456	12.0	29	45	19.3	44	12.8	17.1
Pittsburgh.....	163	12.5	13	59	16.9	26	13.6	16.7
Portland, Oreg.....	71	11.9	2	26	14.3	0	13.5	14.6
Providence.....	62	12.6	5	48	14.5	11	16.4	15.1
Richmond ⁴	43	12.1	3	45	17.0	6	15.5	16.6
White.....	31	12.2	2	45	11.9	1	13.7	13.2
Colored.....	12	11.9	1	46	29.6	5	20.1	25.0
Rochester.....	83	13.0	7	67	13.2	4	12.6	13.1
St. Louis.....	218	13.7	5	18	16.9	21	15.1	16.6
St. Paul.....	55	10.3	4	43	10.0	3	9.8	11.0
Salt Lake City ⁴	33	11.9	0	0	11.7	1	11.9	13.2
San Antonio.....	54	11.4	3	—	16.9	16	13.8	16.4
San Diego.....	67	21.5	2	43	16.7	4	17.6	16.9
San Francisco.....	176	13.9	3	21	16.3	10	14.6	15.2
Schenectady.....	28	15.2	2	88	11.9	2	11.6	9.6
Seattle.....	82	11.4	6	50	11.4	6	11.9	13.6
Somerville.....	16	7.9	1	40	8.9	1	10.7	10.7
South Bend.....	20	9.4	2	58	11.1	3	8.8	7.6
Spokane.....	22	9.8	1	27	15.7	2	13.0	14.6
Springfield, Mass.....	33	11.2	4	67	14.0	4	12.6	11.7
Syracuse.....	65	15.7	3	39	12.7	6	13.2	12.9
Tacoma.....	28	13.5	3	53	15.5	1	11.2	14.3
Tampa ⁴	27	13.1	2	57	18.9	2	11.9	17.7
White.....	17	10.4	1	35	18.5	2	10.6	16.6
Colored.....	10	22.9	1	168	16.4	0	16.8	21.9
Toledo.....	72	12.5	5	54	14.2	6	11.9	12.6
Trenton.....	31	13.1	1	20	13.9	2	15.3	17.7
Utica.....	37	18.8	1	28	19.4	1	15.8	18.7
Washington, D. C. ⁴	143	15.1	13	73	15.9	13	15.6	16.7
White.....	94	13.8	6	40	16.6	6	14.0	16.4
Colored.....	49	18.7	7	125	25.1	7	19.8	24.8
Waterbury.....	21	10.8	2	66	12.4	3	9.1	9.3
Wilmington, Del. ⁷	25	12.3	3	68	14.7	6	12.7	14.7
Worcester.....	43	11.3	7	98	15.6	4	12.0	15.2
Yonkers.....	13	4.8	1	26	10.9	2	7.4	11.0
Youngstown.....	45	13.4	1	97	9.3	5	10.6	11.3

¹ Deaths of nonresidents are included. Stillbirths are excluded.

² These rates represent annual rates per 1,000 population, as estimated for 1932 and 1931 by the arithmetical method.

³ Deaths under 1 year of age per 1,000 live births.—Cities left blank are not in the registration area for births.

⁴ Data for 78 cities.

⁵ Deaths for week ended Friday.

⁶ For the cities for which deaths are shown by color the percentages of colored population in 1930 were as follows: Atlanta, 33; Baltimore, 18; Birmingham, 38; Dallas, 17; Fort Worth, 16; Houston, 27; Indianapolis, 12; Kansas City, Kans., 19; Knoxville, 16; Louisville, 15; Memphis, 38; Miami, 23; Nashville, 23. New Orleans, 29; Richmond, 28; Tampa, 21; and Washington, D. C., 27.

⁷ Population Apr. 1, 1930; decreased 1920 to 1930, no estimate made.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended January 30, 1932, and January 31, 1931

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended January 30, 1932, and January 31, 1931

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Jan. 30, 1932	Week ended Jan. 31, 1931	Week ended Jan. 30, 1932	Week ended Jan. 31, 1931	Week ended Jan. 30, 1932	Week ended Jan. 31, 1931	Week ended Jan. 30, 1932	Week ended Jan. 31, 1931
New England States:								
Maine.....	6	1	459	26	654	48	1	0
New Hampshire.....	1	1	-----	10	30	141	0	0
Vermont.....	-----	-----	-----	-----	197	12	0	0
Massachusetts.....	66	93	35	307	319	588	0	2
Rhode Island.....	11	7	1	21	787	1	0	0
Connecticut.....	6	11	3	176	179	242	1	0
Middle Atlantic States:								
New York.....	142	133	139	1,646	1,200	418	6	31
New Jersey.....	32	81	16	967	115	525	5	7
Pennsylvania.....	160	128	-----	-----	1,589	1,441	10	9
East North Central States:								
Ohio.....	159	120	60	72	500	250	5	8
Indiana.....	53	44	57	68	106	314	12	6
Illinois.....	129	153	52	480	75	886	8	8
Michigan.....	46	53	11	16	223	185	2	5
Wisconsin.....	18	35	19	111	181	335	3	2
West North Central States:								
Minnesota.....	11	15	1	-----	21	56	0	0
Iowa.....	19	13	-----	-----	4	3	0	3
Missouri.....	55	54	4	86	38	830	5	7
North Dakota.....	1	1	-----	-----	5	25	0	2
South Dakota.....	10	31	3	-----	61	8	0	0
Nebraska.....	10	13	46	20	21	12	0	1
Kansas.....	47	11	16	13	43	46	2	4
South Atlantic States:								
Delaware.....	4	1	-----	82	1	8	0	0
Maryland.....	55	26	25	3,148	34	301	2	0
District of Columbia.....	18	11	1	52	-----	27	2	3
Virginia.....	-----	-----	-----	-----	-----	-----	-----	3
West Virginia.....	28	15	58	173	270	36	0	0
North Carolina.....	47	33	30	1,764	146	150	3	0
South Carolina.....	17	12	508	2,873	28	24	0	0
Georgia.....	21	10	84	323	5	52	1	1
Florida.....	13	3	2	46	9	65	0	0

¹ New York City only.

² Week ended Friday.

³ Typhus fever, week ended Jan. 30, 1932, 2 cases in North Carolina.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended January 30, 1932, and January 31, 1931—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Jan. 30, 1932	Week ended Jan. 31, 1931	Week ended Jan. 30, 1932	Week ended Jan. 31, 1931	Week ended Jan. 30, 1932	Week ended Jan. 31, 1931	Week ended Jan. 30, 1932	Week ended Jan. 31, 1931
East South Central States:								
Kentucky.....	39	19			84	170	3	7
Tennessee.....	31	8	78	186	13	64	2	6
Alabama.....	24	24	72	305	5	529	2	6
Mississippi.....	20	21					1	6
West South Central States:								
Arkansas.....	7	3	27	156	2	1	0	1
Louisiana.....	46	49	19	117	20	2	1	7
Oklahoma ⁴	24	43	105	236	119	31	0	0
Texas.....	131	27	72	107	21	148	0	2
Mountain States:								
Montana.....	1		265		80	4	1	1
Idaho.....				5	1	1	0	1
Wyoming.....		1	4	1	2		0	1
Colorado.....	11	11			14	107	1	4
New Mexico.....	13	6	3	6	21	38	0	0
Arizona.....		6	32	10	2	72	2	3
Utah ²				6	1	3	1	1
Pacific States:								
Washington.....	8	10			383	67	0	3
Oregon.....	2	11	121	48	23	78	0	0
California.....	66	57	225	185	319	509	4	4

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Jan. 30, 1932	Week ended Jan. 31, 1931	Week ended Jan. 30, 1932	Week ended Jan. 31, 1931	Week ended Jan. 30, 1932	Week ended Jan. 31, 1931	Week ended Jan. 30, 1932	Week ended Jan. 31, 1931
New England States:								
Maine.....	0	1	32	37	0	0	4	3
New Hampshire.....	0	0	30	1	0	1	3	0
Vermont.....	0	0	7	2	6	6	0	0
Massachusetts.....	0	1	499	375	3	0	2	4
Rhode Island.....	0	0	45	29	0	0	0	0
Connecticut.....	0	0	102	44	6	0	1	0
Middle Atlantic States:								
New York.....	7	1	965	743	4	3	21	7
New Jersey.....	1	0	220	292	0	0	5	1
Pennsylvania.....	0	1	617	656	0	1	23	11
East North Central States:								
Ohio.....	2	4	538	799	49	87	12	9
Indiana.....	0	1	117	462	25	105	1	3
Illinois.....	5	4	432	524	5	66	0	3
Michigan.....	2	1	331	45	3	53	10	7
Wisconsin.....	2	1	111	125	0	7	0	5
West North Central States:								
Minnesota.....	0	1	105	66	2	10	2	7
Iowa.....	0	2	67	150	81	55	2	0
Missouri.....	0	2	88	230	20	25	2	3
North Dakota.....	0	0	18	49	11	11	1	2
South Dakota.....	0	0	13	17	14	36	2	1
Nebraska.....	1	1	36	52	5	62	1	0
Kansas.....	0	1	67	56	3	100	2	1
South Atlantic States:								
Delaware.....	0	0	16	33	0	0	0	0
Maryland ³	1	0	129	112	0	0	4	5
District of Columbia.....	0	0	18	26	0	0	0	1
Virginia.....	1							
West Virginia.....	0	0	51	34	1	11	12	7
North Carolina ³	0	2	55	78	5	2	14	2
South Carolina.....	0	1	12	15	0	0	12	11
Georgia.....	0	0	17	60	0	0	11	3
Florida.....	0	0	4	14	2	0	3	1

¹ Week ended Friday.

² Typhus fever, week ended Jan. 30, 1932; 2 cases in North Carolina.

⁴ Figures for 1932 are exclusive of Oklahoma City and Tulsa.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended January 30, 1932, and January 31, 1931—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Jan. 30, 1932	Week ended Jan. 31, 1931	Week ended Jan. 30, 1932	Week ended Jan. 31, 1931	Week ended Jan. 30, 1932	Week ended Jan. 31, 1931	Week ended Jan. 30, 1932	Week ended Jan. 31, 1931
East South Central States:								
Kentucky.....	0	0	108	150	4	16	23	8
Tennessee.....	0	0	62	39	16	5	17	5
Alabama.....	0	0	34	73	18	3	8	7
Mississippi.....	1	1	15	22	27	11	5	4
West South Central States:								
Arkansas.....	0	0	3	10	3	9	1	5
Louisiana.....	1	0	17	31	3	9	14	1
Oklahoma ¹	1	2	35	47	78	117	23	12
Texas.....	0	0	62	46	16	24	12	6
Mountain States:								
Montana.....	1	0	49	45	0	2	0	1
Idaho.....	0	0	7	10	2	1	0	2
Wyoming.....	0	0	11	26	0	0	1	0
Colorado.....	1	1	38	45	6	6	0	2
New Mexico.....	1	0	11	13	3	2	1	4
Arizona.....	0	1	8	10	0	0	1	2
Utah ¹	1	0	9	13	0	0	0	1
Pacific States:								
Washington.....	0	0	45	51	12	19	2	1
Oregon.....	0	0	30	27	8	38	1	1
California.....	1	6	123	160	8	128	1	7

¹ Week ended Friday.

⁴ Figures for 1932 are exclusive of Oklahoma City and Tulsa.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Men-ingo-coccus menin-gitis	Diph-theria	Influ-enza	Ma-laria	Mea-sles	Pel-lagra	Polio-my-e-litis	Scarlet fever	Small-pox	Ty-phoid fever
<i>November, 1931</i>										
Hawaii Territory.....	1	13	2	-----	108	-----	-----	-----	0	10
<i>December, 1931</i>										
California.....	25	438	532	4	746	5	20	687	39	35
Louisiana.....	5	155	50	46	22	34	1	94	6	98
Montana.....	2	4	14	-----	541	-----	5	162	18	4
Nevada.....	-----	1	1	-----	-----	-----	0	8	0	0
New York.....	33	571	-----	-----	1,995	-----	66	2,133	59	99
Oklahoma ¹	4	319	150	40	13	7	2	181	7	47
Oregon.....	-----	6	146	-----	30	-----	1	67	41	10
South Carolina.....	-----	170	1,520	612	89	98	1	46	0	37
South Dakota.....	-----	37	10	-----	275	-----	1	61	44	14
Texas.....	3	653	78	426	-----	1	8	303	-----	52
Virginia.....	3	738	1,097	9	185	14	3	557	8	98
Washington.....	8	34	54	-----	524	-----	5	195	91	12
Wisconsin.....	7	94	102	-----	229	-----	9	385	43	6

¹ Exclusive of Oklahoma City and Tulsa.

<i>November, 1931</i>		<i>December, 1931</i>	
Hawaii Territory:	Cases	Actinomycosis:	Cases
Chicken pox.....	13	California.....	1
Conjunctivitis, follicular.....	325	Anthrax: ¹	
Dysentery (bacillary).....	3	New York.....	1
Hookworm disease.....	26	Chicken pox:	
Leprosy.....	6	California.....	1,608
Mumps.....	5	Louisiana.....	6
Tetanus.....	3	Montana.....	180
Trachoma.....	101	Nevada.....	7
Whooping cough.....	8	New York.....	2,199

¹ Later report from California states case reported in November, published in Public Health Reports dated Jan. 15, 1932, p. 153, was not anthrax.

Chicken pox—Continued.	Cases	Mumps—Continued.	Cases
Oklahoma ¹	63	South Dakota	41
Oregon	217	Virginia	60
South Carolina	107	Wisconsin	860
South Dakota	152	Ophthalmia neonatorum:	
Virginia	508	New York	8
Washington	515	South Carolina	10
Wisconsin	1,772	South Dakota	3
Dengue:		Paratyphoid fever:	
Louisiana	1	California	5
South Carolina	2	New York	6
Diarrhea:		South Carolina	1
South Carolina	330	Texas	3
Diarrhea and dysentery:		Puerperal septicemia:	
Virginia	93	New York	10
Dysentery:		South Dakota	1
California (amoebic)	9	Washington	1
California (bacillary)	13	Rabies in animals:	
Louisiana	3	California	30
Montana	1	Louisiana	4
New York	19	New York ¹	2
Oklahoma ¹	5	South Carolina	15
Oregon	1	Scabies:	
Food poisoning:		Montana	2
California	7	Oklahoma ¹	12
German measles:		Oregon	53
California	29	Washington	11
Montana	4	Septic sore throat:	
New York	77	California	7
Washington	12	Louisiana	3
Wisconsin	20	Montana	7
Giardia enterica:		New York	23
Montana	2	Oklahoma ¹	36
Granuloma, coccidioidal:		Oregon	9
California	1	South Carolina	7
Hookworm disease:		South Dakota	1
Louisiana	36	Tetanus:	
South Carolina	63	California	4
Impetigo contagiosa:		Louisiana	5
Montana	3	New York	8
Oklahoma ¹	1	South Dakota	1
Oregon	102	Trachoma:	
Washington	9	California	7
Jaundice:		Louisiana	1
California	1	New York	1
Leprosy:		Oklahoma ¹	3
California	1	South Dakota	1
Louisiana	4	Trichinosis:	
Lethargic encephalitis:		New York	2
California	2	Tularaemia:	
New York	6	California	1
Oregon	1	Oklahoma ¹	1
Washington	4	Virginia	13
Wisconsin	1	Wisconsin	3
Mumps:		Typhus fever:	
California	463	California	2
Louisiana	1	New York	3
Montana	10	South Carolina	6
Nevada	3	Undulant fever:	
New York	575	California	8
Oklahoma ¹	19	Louisiana	2
Oregon	84	New York	23
South Carolina	83	Oregon	1

¹ Exclusive of Oklahoma City and Tulsa.² Exclusive of New York City.

Undulant fever—Continued.	Cases	Whooping cough—Continued.	Cases
Virginia.....	3	Montana.....	48
Washington.....	6	Nevada.....	20
Wisconsin.....	3	New York.....	1,652
Vincent's angina:		Oklahoma ¹	25
Montana.....	1	Oregon.....	22
New York ¹	59	South Carolina.....	47
Oklahoma ¹	2	South Dakota.....	51
Oregon.....	18	Virginia.....	805
Whooping cough:		Washington.....	48
California.....	457	Wisconsin.....	840
Louisiana.....	21		

ADMISSIONS TO HOSPITALS FOR THE INSANE, JANUARY, 1930

Reports for the month of January, 1930, showing new admissions to hospitals for the care and treatment of the insane, were received by the Public Health Service from 117 hospitals, located in 39 States, the District of Columbia, and the Territory of Hawaii. The 117 hospitals had 184,913 patients on January 31, 1930, 98,836 males and 86,077 females, the ratio being 115 males per 100 females.

The following table gives the number of new admissions for the month of January, 1930:

Psychoses	Number of first admissions		
	Male	Female	Total
1. Traumatic psychoses.....	20	2	22
2. Senile psychoses.....	181	116	297
3. Psychoses with cerebral arteriosclerosis.....	188	90	278
4. General paralysis.....	211	69	280
5. Psychoses with cerebral syphilis.....	31	7	38
6. Psychoses with Huntington's chorea.....	3	0	3
7. Psychoses with brain tumor.....	3	0	3
8. Psychoses with other brain or nervous disease.....	22	11	33
9. Alcoholic psychoses.....	159	15	174
10. Psychoses due to drugs and other exogenous toxins.....	20	8	28
11. Psychoses with pellagra.....	11	12	23
12. Psychoses with other somatic diseases.....	32	39	71
13. Manic-depressive psychoses.....	208	245	453
14. Involution melancholia.....	12	49	61
15. Dementia praecox (schizophrenia).....	438	305	743
16. Paranoia and paranoid conditions.....	33	34	67
17. Epileptic psychoses.....	52	25	77
18. Psychoneuroses and neuroses.....	27	33	60
19. Psychoses with psychopathic personality.....	17	10	27
20. Psychoses with mental deficiency.....	63	48	111
21. Undiagnosed psychoses.....	141	91	232
22. Without psychosis.....	187	65	252
Total.....	2,059	1,274	3,333

During the month of January, 1930, there were 3,333 new admissions to the hospitals, 61.8 per cent of these new admissions being males and 38.2 per cent females, the ratio being 162 males per 100 females. Of the new admissions, 484 were reported as being undiagnosed or "without psychosis." There were 2,849 new admissions for which provisional diagnoses were made. Of these 2,849 patients, cases of dementia praecox constituted 26.1 per cent; manic-depres-

¹ Exclusive of Oklahoma City and Tulsa.

² Exclusive of New York City.

sive psychoses, 15.9 per cent; senile psychoses, 10.4 per cent; general paralysis, 9.8 per cent, and psychoses with cerebral arteriosclerosis, 9.8 per cent. These five classes accounted for 72 per cent of the new admissions for which diagnoses were made.

The following table shows the number of patients in the hospitals and on parole on January 31, 1930:

	Number of patients on books		
	Male	Female	Total
Patients on books last day of month:			
In hospitals.....	89,265	78,694	167,959
On parole or otherwise absent, but still on books.....	9,571	7,383	16,954
Total.....	98,836	86,077	184,913

Of the 184,913 patients, 9,571 males and 7,383 females were on parole at the end of the month—9.7 per cent of the males, 8.6 per cent of the females, and 9.2 per cent of the total number of patients.

GENERAL CURRENT SUMMARY AND WEEKLY REPORTS FROM CITIES

The 95 cities reporting cases used in the following table are situated in all parts of the country and have an estimated aggregate population of more than 33,805,000. The estimated population of the 88 cities reporting deaths is more than 32,246,000. The estimated expectancy is based on the experience of the last nine years, excluding epidemics.

Weeks ended January 23, 1932, and January 24, 1931

	1932	1931	Estimated expectancy
<i>Cases reported</i>			
Diphtheria:			
46 States.....	1,627	1,335	
95 cities.....	632	506	886
Measles:			
45 States.....	7,230	7,992	
95 cities.....	2,248	2,491	
Meningococcus meningitis:			
46 States.....	71	132	
95 cities.....	37	58	
Poliomyelitis: 46 States.....	39	47	
Scarlet fever:			
46 States.....	5,055	5,453	
95 cities.....	1,947	2,133	1,516
Smallpox:			
46 States.....	603	990	
95 cities.....	33	103	54
Typhoid fever:			
46 States.....	255	148	
95 cities.....	47	40	34
<i>Deaths reported</i>			
Influenza and pneumonia: 88 cities.....	806	1,712	
Smallpox:			
88 cities.....	1	0	
Little Rock, Ark.....	1	0	

City reports for week ended January 23, 1932

The "estimated expectancy" given for diphtheria, poliomyelitis, scarlet fever, smallpox, and typhoid fever is the result of an attempt to ascertain from previous occurrence the number of cases of the disease under consideration that may be expected to occur during a certain week in the absence of epidemics. It is based on reports to the Public Health Service during the past nine years. It is in most instances the median number of cases reported in the corresponding weeks of the preceding years. When the reports include several epidemics, or when for other reasons the median is unsatisfactory, the epidemic periods are excluded, and the estimated expectancy is the mean number of cases reported for the week during nonepidemic years.

If the reports have not been received for the full nine years, data are used for as many years as possible, but no year earlier than 1923 is included. In obtaining the estimated expectancy, the figures are smoothed when necessary to avoid abrupt deviation from the usual trend. For some of the diseases given in the table the available data were not sufficient to make it practicable to compute the estimated expectancy.

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
NEW ENGLAND								
Maine:								
Portland.....	2	1	0	-----	0	197	1	8
New Hampshire:								
Concord.....	0	0	0	-----	0	0	0	2
Manchester.....	0	1	0	-----	0	0	0	3
Nashua.....	1	0	0	-----	0	0	0	0
Vermont:								
Barre.....	0	0	0	-----	0	0	0	0
Burlington.....	4	1	0	-----	0	50	3	0
Massachusetts:								
Boston.....	61	34	17	4	0	15	30	14
Fall River.....	10	4	1	-----	0	9	1	1
Springfield.....	13	5	0	-----	0	4	16	5
Worcester.....	13	5	1	-----	0	1	60	3
Rhode Island:								
Pawtucket.....	0	1	0	-----	0	0	0	0
Providence.....	19	8	2	-----	1	634	22	2
Connecticut:								
Bridgeport.....	9	5	0	1	2	0	0	5
Hartford.....	-----	5	-----	-----	-----	-----	-----	-----
New Haven.....	12	1	0	1	0	0	21	2
MIDDLE ATLANTIC								
New York:								
Buffalo.....	33	12	6	-----	2	8	0	20
New York.....	211	203	151	29	8	28	75	169
Rochester.....	9	6	1	-----	0	78	12	7
Syracuse.....	20	2	0	-----	0	45	11	5
New Jersey:								
Camden.....	4	5	1	-----	0	1	0	7
Newark.....	68	17	4	-----	0	2	19	5
Trenton.....	1	2	0	1	0	1	6	1
Pennsylvania:								
Philadelphia.....	124	66	10	7	7	3	35	43
Pittsburgh.....	56	18	12	3	1	182	66	22
Reading.....	15	2	0	-----	0	0	1	5
EAST NORTH CENTRAL								
Ohio:								
Cincinnati.....	4	8	9	-----	3	0	0	13
Cleveland.....	158	30	7	14	1	181	135	17
Columbus.....	8	3	13	-----	2	1	0	9
Toledo.....	51	6	2	1	1	1	2	6
Indiana:								
Fort Wayne.....	3	4	11	-----	0	0	0	7
Indianapolis.....	44	6	3	-----	2	0	46	11
South Bend.....	6	1	0	-----	0	0	0	0
Terre Haute.....	2	0	1	-----	0	0	0	0
Illinois:								
Chicago.....	109	98	63	27	2	54	13	45
Springfield.....	2	1	1	-----	0	0	2	2

City reports for week ended January 23, 1932—Continued

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
EAST NORTH CENTRAL—continued								
Michigan:								
Detroit.....	84	49	46	10	5	27	9	18
Flint.....	18	3	1	—	0	21	45	8
Grand Rapids.....	7	1	0	—	1	51	2	1
Wisconsin:								
Kenosha.....	7	1	1	—	0	0	1	1
Madison.....	8	1	0	—	0	1	2	2
Milwaukee.....	87	15	4	1	1	23	34	6
Racine.....	24	1	3	—	0	2	68	0
Superior.....	1	1	0	—	0	1	6	1
WEST NORTH CENTRAL								
Minnesota:								
Duluth.....	6	0	0	—	0	1	0	2
Minneapolis.....	29	15	6	—	0	2	28	8
St. Paul.....	21	4	0	—	0	1	1	6
Iowa:								
Davenport.....	0	1	0	—	—	0	1	—
Des Moines.....	0	1	4	—	—	0	0	—
Sioux City.....	5	0	4	—	—	0	0	—
Waterloo.....	5	0	0	—	—	0	1	—
Missouri:								
Kansas City.....	18	6	15	—	1	0	4	9
St. Joseph.....	3	2	1	—	0	0	1	6
St. Louis.....	14	41	9	1	0	2	9	11
North Dakota:								
Fargo.....	5	0	0	—	0	25	0	0
Grand Forks.....	1	1	0	—	—	3	0	—
South Dakota:								
Aberdeen.....	5	0	0	—	—	10	0	—
Sioux Falls.....	0	1	0	—	—	0	0	—
Nebraska:								
Omaha.....	7	4	5	—	0	1	6	8
Kansas:								
Topeka.....	16	2	1	—	1	0	2	0
Wichita.....	40	2	13	—	0	47	1	3
SOUTH ATLANTIC								
Delaware:								
Wilmington.....	3	2	1	—	0	1	0	5
Maryland:								
Baltimore.....	104	22	11	16	4	2	52	29
Cumberland.....	1	1	0	—	0	0	0	2
Frederick.....	0	0	1	—	0	3	1	0
District of Columbia:								
Washington.....	20	17	19	1	0	3	0	12
Virginia:								
Lynchburg.....	9	1	1	—	0	0	0	1
Norfolk.....	10	2	4	—	0	0	0	4
Richmond.....	3	5	8	—	3	0	0	5
Roanoke.....	7	1	3	—	0	0	2	0
West Virginia:								
Charleston.....	6	2	2	—	0	9	0	0
Huntington.....	0	—	4	—	0	1	0	0
Wheeling.....	0	1	0	—	0	0	1	3
North Carolina:								
Raleigh.....	3	1	1	—	0	34	0	2
Wilmington.....	0	1	0	—	0	0	0	2
Winston Salem.....	17	1	2	—	0	0	3	3
South Carolina:								
Charleston.....	0	1	0	27	0	0	0	2
Columbia.....	0	0	0	—	0	1	0	8
Greenville.....	1	0	0	—	—	0	2	—
Georgia:								
Atlanta.....	3	4	5	36	1	2	0	14
Brunswick.....	0	0	0	—	0	0	0	1
Savannah.....	1	2	0	12	3	1	0	4
Florida:								
Miami.....	1	2	4	—	0	1	0	2
Tampa.....	0	2	1	—	1	0	1	2

City reports for week ended January 23, 1932—Continued

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
EAST SOUTH CENTRAL								
Kentucky:								
Covington.....	2	1	0	-----	0	0	1	0
Lexington.....	0	-----	5	-----	0	0	5	1
Tennessee:								
Memphis.....	4	4	9	-----	3	1	0	9
Nashville.....	3	1	0	-----	1	0	0	1
Alabama:								
Birmingham.....	3	3	4	3	2	1	2	4
Mobile.....	0	1	1	-----	1	0	0	2
Montgomery.....	2	1	1	2	-----	1	4	-----
WEST SOUTH CENTRAL								
Arkansas:								
Fort Smith.....	2	0	0	-----	-----	0	0	-----
Little Rock.....	0	1	0	-----	0	0	1	2
Louisiana:								
New Orleans.....	0	14	23	3	1	0	0	14
Shreveport.....	0	2	1	-----	0	40	1	5
Oklahoma:								
Tulsa.....	7	2	3	-----	-----	0	1	-----
Texas:								
Dallas.....	10	8	26	-----	0	9	0	7
Fort Worth.....	6	5	5	-----	0	2	0	0
Galveston.....	0	1	1	-----	0	0	0	1
Houston.....	0	9	25	-----	2	0	0	13
San Antonio.....	1	2	3	-----	1	0	0	7
MOUNTAIN								
Montana:								
Billings.....	3	0	0	-----	0	17	0	0
Great Falls.....	0	0	0	-----	0	0	0	0
Helena.....	0	0	0	-----	0	37	0	0
Missoula.....	0	0	0	-----	0	0	0	0
Idaho:								
Boise.....	-----	0	-----	-----	-----	-----	-----	-----
Colorado:								
Denver.....	18	8	8	-----	1	3	23	10
Pueblo.....	26	1	0	-----	1	0	0	4
New Mexico:								
Albuquerque.....	11	1	2	-----	0	1	0	1
Arizona:								
Phoenix.....	-----	-----	-----	-----	-----	-----	-----	8
Utah:								
Salt Lake City.....	26	8	0	-----	1	1	0	2
Nevada:								
Reno.....	0	0	0	-----	0	0	0	1
PACIFIC								
Washington:								
Seattle.....	40	3	8	-----	-----	292	10	-----
Spokane.....	11	2	0	-----	-----	4	0	-----
Tacoma.....	7	4	1	-----	0	2	1	8
Oregon:								
Portland.....	37	9	1	2	0	26	12	3
Salem.....	3	1	0	3	-----	2	0	-----
California:								
Los Angeles.....	79	38	37	122	2	4	8	25
Sacramento.....	26	1	3	-----	1	93	3	13
San Francisco.....	56	13	3	15	3	40	2	7

City reports for week ended January 23, 1932—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuber- culosis, deaths re- ported	Typhoid fever			Whoop- ing cough, cases re- ported	Deaths, all causes
	Cases, esti- mated expect- ancy	Cases re- ported	Cases, esti- mated expect- ancy	Cases re- ported	Deaths re- ported		Cases, esti- mated expect- ancy	Cases re- ported	Deaths re- ported		
NEW ENGLAND											
Maine:											
Portland.....	3	4	0	0	0	1	0	0	0	3	37
New Hampshire:											
Concord.....	0	6	0	0	0	0	0	0	0	0	10
Manchester.....	2	5	0	0	0	0	0	0	1	0	31
Nashau.....	0	1	0	0	0	0	0	0	0	0	-----
Vermont:											
Barre.....	0	0	0	0	0	3	0	0	0	0	5
Burlington.....	1	1	-----	1	0	0	0	0	0	0	9
Massachusetts:											
Boston.....	97	154	0	0	0	8	1	1	0	24	215
Fall River.....	4	11	0	0	0	2	0	0	0	0	26
Springfield.....	9	10	0	0	0	0	0	0	0	9	37
Worcester.....	13	31	0	0	0	0	0	0	0	11	43
Rhode Island:											
Pawtucket.....	1	0	0	0	0	0	0	0	0	0	13
Providence.....	16	19	0	0	0	3	0	0	0	19	62
Connecticut:											
Bridgeport.....	10	8	0	3	0	2	1	0	0	0	40
Hartford.....	7	-----	0	-----	-----	0	0	-----	-----	-----	-----
New Haven.....	7	16	0	0	0	1	0	0	0	15	35
MIDDLE ATLANTIC											
New York:											
Buffalo.....	27	70	0	0	0	6	1	0	0	29	140
New York.....	241	386	0	0	0	76	7	5	1	161	1,385
Rochester.....	11	54	0	0	0	1	0	0	0	2	79
Syracuse.....	15	24	0	0	0	1	1	0	0	78	65
New Jersey:											
Camden.....	7	24	0	0	0	1	0	0	0	3	39
Newark.....	28	27	0	0	0	4	1	0	0	39	76
Trenton.....	5	10	0	0	0	3	0	0	0	0	31
Pennsylvania:											
Philadelphia.....	101	158	0	0	0	18	2	1	0	317	456
Pittsburgh.....	36	64	0	0	0	8	1	3	1	42	163
Reading.....	4	0	0	0	0	3	0	0	0	11	30
EAST NORTH CENTRAL											
Ohio:											
Cincinnati.....	24	39	1	1	0	6	0	1	0	5	141
Cleveland.....	45	62	1	0	0	11	2	1	0	141	190
Columbus.....	13	12	1	0	0	5	0	0	0	10	81
Toledo.....	15	5	1	0	0	6	0	0	0	62	72
Indiana:											
Fort Wayne.....	6	3	1	0	0	0	0	0	0	2	29
Indianapolis.....	12	10	5	1	0	2	0	0	0	31	-----
South Bend.....	4	3	0	0	0	1	0	0	0	1	20
Terre Haute.....	3	0	0	0	0	1	0	0	0	0	20
Illinois:											
Chicago.....	139	177	1	3	0	33	3	1	0	190	646
Springfield.....	3	5	0	0	0	2	0	0	0	15	27
Michigan:											
Detroit.....	112	142	2	0	0	16	0	2	0	114	269
Flint.....	14	13	1	0	0	0	0	0	1	9	25
Grand Rapids.....	14	7	0	0	0	1	0	0	0	3	17
Wisconsin:											
Kenosha.....	3	9	0	0	0	0	0	0	0	1	10
Madison.....	4	1	0	0	0	0	0	0	0	5	22
Milwaukee.....	37	41	0	0	0	3	0	0	0	181	106
Racine.....	6	1	0	0	0	0	0	0	0	1	15
Superior.....	3	0	0	0	0	0	0	0	0	0	8
WEST NORTH CENTRAL											
Minnesota:											
Duluth.....	11	5	0	0	0	2	0	0	0	0	20
Minneapolis.....	47	26	0	0	0	0	0	0	0	8	80
St. Paul.....	29	14	0	0	0	3	0	0	0	10	61

City reports for week ended January 23, 1932—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuber- culosis, deaths re- ported	Typhoid fever			Whoop- ing cough, cases re- ported	Deaths, all causes
	Cases, esti- mated expec- tancy	Cases re- ported	Cases, esti- mated expec- tancy	Cases re- ported	Deaths re- ported		Cases, esti- mated expec- tancy	Cases re- ported	Deaths re- ported		
WEST NORTH CENTRAL—continued											
Iowa:											
Davenport.....	1	16	2	1	-----	-----	0	0	-----	0	-----
Des Moines.....	8	5	2	0	-----	-----	0	0	-----	0	22
Sioux City.....	1	3	1	5	-----	-----	0	0	-----	4	-----
Waterloo.....	1	0	0	0	-----	-----	0	1	-----	9	-----
Missouri:											
Kansas City.....	19	22	1	0	0	11	0	0	0	49	116
St. Joseph.....	2	1	0	0	0	1	0	0	0	0	30
St. Louis.....	48	12	1	0	0	12	0	1	0	75	218
North Dakota:											
Fargo.....	3	2	1	0	-----	-----	0	0	-----	0	-----
Grand Forks.....	0	0	0	0	-----	-----	0	0	-----	0	-----
South Dakota:											
Aberdeen.....	0	1	0	4	-----	-----	0	0	-----	4	-----
Sioux Falls.....	1	0	0	1	-----	-----	0	0	-----	0	5
Nebraska:											
Omaha.....	7	4	2	2	0	2	0	0	0	0	50
Kansas:											
Topeka.....	3	3	1	0	0	0	0	0	0	23	10
Wichita.....	4	3	0	0	0	1	0	0	0	1	36
SOUTH ATLANTIC											
Delaware:											
Wilmington.....	7	8	0	0	0	1	0	0	1	6	25
Maryland:											
Baltimore.....	35	33	0	0	0	13	1	0	0	178	241
Cumberland.....	1	3	0	0	0	1	0	0	0	0	18
Frederick.....	0	2	0	0	0	0	0	0	0	6	4
District of Colum- bia:											
Washington.....	26	21	1	0	0	6	1	3	0	21	143
Virginia:											
Lynchburg.....	1	2	0	0	0	0	0	0	0	5	18
Norfolk.....	3	5	0	0	0	0	0	1	0	2	-----
Richmond.....	7	16	0	0	0	7	0	0	0	0	45
Roanoke.....	2	8	1	0	0	0	0	0	0	1	19
West Virginia:											
Charleston.....	2	3	0	0	0	2	0	1	0	2	13
Huntington.....	-----	2	-----	0	0	0	-----	0	0	0	0
Wheeling.....	3	3	0	0	0	0	0	0	0	1	13
North Carolina:											
Raleigh.....	1	1	1	0	0	0	0	0	0	5	15
Wilmington.....	0	2	0	0	0	0	0	0	0	23	12
Winston-Salem.....	3	1	1	0	0	0	0	3	0	19	12
South Carolina:											
Charleston.....	1	0	0	0	0	0	0	0	0	0	17
Columbia.....	0	0	0	0	0	1	0	0	1	0	37
Greenville.....	-----	1	0	0	-----	-----	-----	0	-----	3	-----
Georgia:											
Atlanta.....	5	7	0	0	0	3	0	0	0	2	72
Brunswick.....	0	0	0	0	0	0	0	0	0	0	6
Savannah.....	1	1	0	0	0	0	1	3	0	1	45
Florida:											
Miami.....	0	0	0	0	0	7	0	0	0	2	35
Tampa.....	1	0	0	0	0	1	1	5	0	1	26
EAST SOUTH CENTRAL											
Kentucky:											
Covington.....	2	4	1	0	0	0	0	0	0	2	17
Lexington.....	-----	2	-----	0	0	0	-----	0	0	1	9
Tennessee:											
Memphis.....	8	9	2	3	0	8	1	0	0	24	92
Nashville.....	2	3	0	0	0	3	0	0	0	4	36
Alabama:											
Birmingham.....	6	1	1	0	0	5	0	0	0	0	50
Mobile.....	2	3	0	1	0	0	0	2	0	0	16
Montgomery.....	2	0	0	0	-----	-----	1	0	0	0	-----

City reports for week ended January 23, 1932—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuber- culosis, deaths re- ported	Typhoid fever			Whoop- ing cough, cases re- ported	Deaths, all causes
	Cases, esti- mated expect- ancy	Cases re- ported	Cases, esti- mated expect- ancy	Cases re- ported	Deaths re- ported		Cases, esti- mated expect- ancy	Cases re- ported	Deaths re- ported		
WEST SOUTH CENTRAL											
Arkansas:											
Fort Smith.....	1	0	0	0			0	0		1	
Little Rock.....	2	0	0	0	1	5	0	1	0	2	
Louisiana:											
New Orleans.....	7	8	0	0	0	10	3	2	2	3	132
Shreveport.....	1	1	0	0	0	3	0	0	0	2	31
Oklahoma:											
Tulsa.....	2	3	0	0			0	0		0	
Texas:											
Dallas.....	7	12	1	0	0	5	0	1	1	4	60
Fort Worth.....	4	4	0	1	0	1	1	0	0	0	29
Galveston.....	1	0	0	0	0	2	0	0	0	0	16
Houston.....	4	3	5	0	0	5	0	2	0	0	72
San Antonio.....	3	1	1	0	0	9	0	1	1	0	54
MOUNTAIN											
Montana:											
Billings.....	0	0	0	0	0	0	0	0	0	0	1
Great Falls.....	5	2	1	0	0	0	0	0	0	0	6
Helena.....	0	0	3	0	0	0	0	0	0	0	6
Missoula.....	0	4	0	0	0	0	0	0	0	0	2
Idaho:											
Boise.....	2		0				0				
Colorado:											
Denver.....	14	15	0	0	0	6	0	0	0	7	90
Pueblo.....	2	1	0	0	0	0	1	0	0	2	10
New Mexico:											
Albuquerque.....	1	2	0	0	0	0	0	0	0	0	9
Arizona:											
Phoenix.....	0		0		0	4	0		0		25
Utah:											
Salt Lake City.....	5	6	1	0	0	1	0	0	0	1	33
Nevada:											
Reno.....	0	1	0	0	0	0	0	0	0	0	5
PACIFIC											
Washington:											
Seattle.....	12	13	2	1			1	2		5	
Spokane.....	8	0	4	2			0	0		0	
Tacoma.....	4	3	2	0	0	0	0	0	0	2	23
Oregon:											
Portland.....	6	0	8	4	0	1	1	1	0	4	71
Salem.....	0	0		0				0		0	
California:											
Los Angeles.....	41	41	4	6	0	26	2	0	0	14	343
Sacramento.....	2	2	1	0	0	4	0	2	0	0	47
San Francisco.....	22	8	2	5	0	7	1	2	0	1	176

Division, State, and city	Meningo- coccus meningitis		Lethargic en- cephalitis		Pellagra		Poliomyelitis (infan- tile paralysis)			
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases, esti- mated expect- ancy	Cases	Deaths	
NEW ENGLAND										
Massachusetts:										
Boston.....	0	0	0	0	0	0	1	2		1
Worcester.....	0	0	0	0	0	0	0	2		0
Rhode Island:										
Providence.....	0	0	1	0	0	0	0	0		0

City reports for week ended January 23, 1932—Continued

Division, State, and city	Meningo- coccus meningitis		Lethargic en- cephalitis		Pellagra		Poliomyelitis (infan- tile paralysis)		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases, esti- mated expect- ancy	Cases	Deaths
MIDDLE ATLANTIC									
New York:									
New York.....	2	1	0	2	0	0	1	1	0
Syracuse.....	1	0	0	0	0	0	0	0	0
New Jersey:									
Newark.....	0	0	0	0	0	0	0	1	0
Trenton.....	0	0	1	0	0	0	0	0	0
Pennsylvania:									
Philadelphia.....	5	2	0	0	0	0	0	0	0
Pittsburgh.....	2	1	0	0	0	0	0	0	0
EAST NORTH CENTRAL									
Ohio:									
Cleveland.....	2	1	0	0	0	0	0	0	0
Columbus.....	1	0	0	0	0	0	0	0	0
Indiana:									
Indianapolis.....	5	2	0	0	0	0	0	0	0
Illinois:									
Chicago.....	6	3	0	0	0	0	0	1	1
Michigan:									
Detroit.....	2	1	0	0	0	0	1	1	0
Flint.....	1	1	0	0	0	0	0	0	0
Wisconsin:									
Milwaukee.....	1	0	0	0	0	0	0	0	0
Racine.....	1	1	1	1	0	0	0	0	0
WEST NORTH CENTRAL									
Minnesota:									
Minneapolis.....	0	0	0	0	0	0	0	1	0
Missouri:									
Kansas City.....	1	0	0	1	0	0	0	0	0
St. Louis.....	0	0	1	1	0	0	0	0	0
South Dakota:									
Aberdeen.....	0		0		0		0	1	
SOUTH ATLANTIC									
Maryland:									
Baltimore.....	2	0	0	0	0	0	0	0	0
Cumberland.....	1	1	0	0	0	0	0	0	0
North Carolina:									
Winston-Salem.....	0	0	0	0	1	0	0	0	0
South Carolina:									
Charleston.....	0	0	0	0	2	0	0	0	0
Columbia.....	0	0	0	0	0	1	0	0	0
Georgia:									
Savannah.....	1	0	0	0	2	0	0	0	0
EAST SOUTH CENTRAL									
Tennessee:									
Memphis.....	1	0	0	0	0	0	0	0	0
Alabama:									
Birmingham.....	0	0	0	0	1	1	0	0	0
WEST SOUTH CENTRAL									
Louisiana:									
New Orleans.....	0	0	0	0	0	0	0	1	0
Texas:									
Fort Worth.....	0	0	0	0	0	1	0	0	0
Houston.....	0	2	0	0	0	0	0	0	0
MOUNTAIN									
New Mexico:									
Albuquerque.....	0	1	0	0	0	0	0	0	0
Utah:									
Salt Lake City.....	0	1	0	0	0	0	0	0	0
PACIFIC									
California:									
Los Angeles.....	1	1	0	0	0	0	0	0	0
San Francisco.....	1	1	0	0	0	0	1	0	0

The following table gives the rates per 100,000 population for 98 cities for the 5-week period ended January 23, 1932, compared with those for a like period ended January 24, 1931. The population figures used in computing the rates are estimated mid-year populations for 1931 and 1932, respectively, derived from the 1930 census. The 98 cities reporting cases have an estimated aggregate population of more than 34,000,000. The 91 cities reporting deaths have more than 32,400,000 estimated population.

*Summary of weekly reports from cities, December 20, 1931, to January 23, 1932—Annual rates per 100,000 population, compared with rates for the corresponding period of 1930-31*¹

DIPHTHERIA CASE RATES

	Week ended—									
	Dec. 26, 1931	Dec. 27, 1930	Jan. 2, 1932	Jan. 3, 1931	Jan. 9, 1932	Jan. 10, 1931	Jan. 16, 1932	Jan. 17, 1931	Jan. 23, 1932	Jan. 24, 1931
98 cities.....	72	71	72	80	83	81	88	74	98	79
New England.....	65	75	84	116	79	79	86	91	55	106
Middle Atlantic.....	57	47	56	68	50	63	82	56	82	67
East North Central.....	69	102	64	91	76	96	68	95	97	93
West North Central.....	134	54	130	83	131	98	106	82	102	84
South Atlantic.....	99	86	71	62	114	85	94	69	108	65
East South Central.....	111	84	100	72	162	117	81	70	87	76
West South Central.....	115	143	129	136	204	142	195	108	260	81
Mountain.....	26	62	44	62	121	35	43	62	72	35
Pacific.....	41	40	64	55	65	61	97	47	99	88

MEASLES CASE RATES

98 cities.....	126	181	191	281	300	351	278	324	347	405
New England.....	945	305	1,207	268	1,706	490	1,905	310	2,235	522
Middle Atlantic.....	66	70	93	101	146	178	116	158	154	251
East North Central.....	32	27	93	55	142	62	182	87	215	80
West North Central.....	50	1,277	38	1,894	157	2,156	78	1,829	150	1,984
South Atlantic.....	14	124	79	322	53	435	71	500	110	806
East South Central.....	17	323	29	921	17	869	6	1,004	17	705
West South Central.....	41	24	64	24	43	20	73	7	162	10
Mountain.....	339	229	513	317	1,172	226	517	374	518	757
Pacific.....	259	16	445	24	784	33	544	55	828	78

SCARLET FEVER CASE RATES

98 cities.....	187	222	226	231	274	277	315	316	301	334
New England.....	389	353	539	327	549	433	582	539	673	575
Middle Atlantic.....	205	190	240	229	286	242	390	282	361	314
East North Central.....	227	285	233	261	298	363	335	396	312	884
West North Central.....	126	246	115	238	229	297	220	321	180	323
South Atlantic.....	107	178	221	262	227	277	239	305	215	343
East South Central.....	157	341	112	299	225	399	121	470	116	457
West South Central.....	41	59	108	108	69	68	99	129	82	142
Mountain.....	113	379	209	220	336	322	259	331	259	357
Pacific.....	61	85	109	73	141	73	129	73	128	120

¹ The figures given in this table are rates per 100,000 population, annual basis, and not the number of cases reported. Populations used are estimated as of July 1, 1932, and 1931, respectively.

² Spokane, Wash., not included.

³ Fort Wayne, Ind., not included.

⁴ Hartford, Conn., and Boise, Idaho, not included.

⁵ Columbia, S. C., not included.

⁶ Hartford, Conn., not included.

⁷ Boise, Idaho, not included.

*Summary of weekly reports from cities, December 20, 1931, to January 23, 1932—
Annual rates per 100,000 population, compared with rates for the corresponding
period of 1930-31—Continued*

SMALLPOX CASE RATES

	Week ended—									
	Dec. 26, 1931	Dec. 27, 1930	Jan. 2, 1932	Jan. 3, 1931	Jan. 9, 1932	Jan. 16, 1931	Jan. 16, 1932	Jan. 17, 1931	Jan. 23, 1932	Jan. 24, 1931
98 cities.....	4	7	13	7	6	13	14	16	15	16
New England.....	14	0	12	0	26	0	2	0	18	0
Middle Atlantic.....	0	0	0	0	0	0	0	0	0	0
East North Central.....	4	2	7	5	1	15	11	10	3	21
West North Central.....	10	43	4	46	6	63	17	98	13	77
South Atlantic.....	0	0	0	0	0	2	0	0	0	14
East South Central.....	0	0	0	0	23	6	12	18	23	29
West South Central.....	7	17	0	17	26	37	16	27	0	34
Mountain.....	0	35	9	9	9	9	9	78	10	9
Pacific.....	8	20	16	10	19	18	8	29	27	20

TYPHOID FEVER CASE RATES

	6	7	15	5	4	4	15	5	17	16
98 cities.....	6	7	15	5	4	4	15	5	17	16
New England.....	2	2	12	2	2	5	0	0	13	2
Middle Atlantic.....	4	3	3	4	5	2	4	2	4	3
East North Central.....	2	12	4	4	2	2	12	2	3	3
West North Central.....	4	6	2	2	2	0	2	4	4	10
South Atlantic.....	14	16	6	4	8	10	18	10	29	14
East South Central.....	12	18	35	48	0	12	29	53	12	12
West South Central.....	44	0	3	3	13	20	10	14	23	27
Mountain.....	0	9	0	18	9	17	9	9	10	17
Pacific.....	4	6	18	6	4	2	0	2	11	6

INFLUENZA DEATH RATES

	9	11	13	16	18	24	14	36	12	12
91 cities.....	9	11	13	16	18	24	14	36	12	12
New England.....	7	2	2	7	10	5	19	10	18	12
Middle Atlantic.....	7	10	5	17	12	29	12	59	8	91
East North Central.....	5	7	10	7	14	12	15	9	10	18
West North Central.....	3	9	9	3	9	21	3	18	6	29
South Atlantic.....	12	24	18	20	35	28	12	42	24	138
East South Central.....	32	19	25	26	31	45	44	64	44	64
West South Central.....	24	32	45	93	30	76	30	79	13	83
Mountain.....	70	0	131	18	103	44	103	35	127	44
Pacific.....	7	17	14	10	23	22	26	10	14	22

PNEUMONIA DEATH RATES

	101	126	121	164	144	187	126	219	120	229
91 cities.....	101	126	121	164	144	187	126	219	120	229
New England.....	94	119	91	160	165	113	103	159	109	178
Middle Atlantic.....	101	126	126	184	148	233	133	311	126	332
East North Central.....	77	94	84	103	104	110	182	194	79	128
West North Central.....	118	117	108	180	131	200	119	212	154	171
South Atlantic.....	132	174	174	230	196	267	208	237	186	261
East South Central.....	113	149	140	207	169	267	132	229	107	299
West South Central.....	131	189	152	199	128	238	148	228	165	245
Mountain.....	226	194	165	264	296	244	181	270	182	157
Pacific.....	89	135	175	135	167	134	158	118	123	108

¹ Spokane, Wash., not included.

² Fort Wayne, Ind., not included.

³ Hartford, Conn., and Boise, Idaho, not included.

⁴ Columbia, S. C., not included.

⁵ Hartford, Conn., not included.

⁷ Boise, Idaho, not included.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Weeks ended January 9 and 16, 1932.—The Bureau of Pensions and National Health of Canada reports cases of certain communicable diseases for the weeks ended January 9 and 16, 1932, as follows:

WEEK ENDED JANUARY 9, 1932

Province	Cerebro-spinal fever	Dysentery	Influenza	Lethargic encephalitis	Poliomyelitis	Small-pox	Typhoid fever
Prince Edward Island ¹	-----	-----	-----	-----	-----	-----	-----
Nova Scotia.....	1	-----	7	-----	-----	-----	-----
New Brunswick.....	-----	-----	-----	-----	-----	-----	1
Quebec ¹	-----	-----	-----	-----	-----	-----	-----
Ontario.....	-----	-----	-----	-----	-----	2	7
Manitoba.....	-----	-----	-----	-----	-----	-----	1
Saskatchewan.....	-----	-----	-----	-----	-----	10	1
Alberta ¹	-----	-----	-----	-----	-----	-----	-----
British Columbia.....	1	-----	-----	-----	-----	2	1
Total.....	2	-----	7	-----	-----	14	11

WEEK ENDED JANUARY 16, 1932

Prince Edward Island ¹	-----	-----	-----	-----	-----	-----	1
Nova Scotia.....	-----	-----	5	-----	-----	-----	3
New Brunswick.....	-----	-----	-----	-----	-----	-----	-----
Quebec ¹	-----	-----	-----	-----	-----	-----	-----
Ontario.....	2	-----	1	1	1	3	3
Manitoba.....	-----	-----	-----	-----	-----	-----	5
Saskatchewan.....	-----	-----	-----	-----	-----	21	1
Alberta.....	-----	-----	-----	-----	1	-----	-----
British Columbia.....	-----	2	-----	-----	-----	1	-----
Total.....	2	2	6	1	2	25	13

¹ No case of any disease included in the table was reported during the week.

² No report received for the week.

Ontario—Communicable diseases—Comparative—Four weeks ended December 26, 1931.—Certain communicable diseases were reported in the Province of Ontario, Canada, for the four weeks ended December 26, 1931, and the corresponding period of the year 1930, as follows:

Disease	1930		1931	
	Cases	Deaths	Cases	Deaths
Cerebrospinal meningitis.....	2	5	4	2
Chanoroid.....			8	
Chicken pox.....	1,196		898	
Diphtheria.....	355	14	274	11
Dysentery.....	1	1	2	
Erysipelas.....	1		6	
German measles.....	26		23	
Gonorrhea.....	172		298	
Influenza.....	14	4	5	2
Jaundice.....			24	
Lethargic encephalitis.....			1	1
Measles.....	83		2,428	3
Mumps.....	448		464	1
Paratyphoid fever.....			6	
Pneumonia.....		126		107
Poliomyelitis.....	9		2	
Scarlet fever.....	612	1	468	
Smallpox ¹	4		6	
Septic sore throat.....	296	5	14	1
Syphilis.....	143		193	
Trench mouth.....			2	
Tuberculosis.....	136	29	209	29
Tularaemia.....			1	
Typhoid fever.....	50	2	53	2
Undulant fever.....	2		4	
Whooping cough.....	338	4	578	1

¹ The following municipalities reported cases of smallpox during the period: Ottawa, 2; Ernestown, 3; and East York, 1.

Quebec Province—Communicable diseases—Week ended January 23, 1932.—The Bureau of Health of the Province of Quebec, Canada, reports cases of certain communicable diseases for the week ended January 23, 1932, as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis.....	1	Poliomyelitis.....	3
Chicken pox.....	100	Puerperal septicemia.....	3
Diphtheria.....	66	Scarlet fever.....	81
Erysipelas.....	3	Smallpox.....	1
German measles.....	18	Typhoid fever.....	5
Measles.....	319	Whooping cough.....	54
Ophthalmia neonatorum.....	1		

Quebec Province—Vital statistics—April–July, 1931.—Births, deaths, and marriages for the months of April to July, 1931, in the Province of Quebec, Canada, with deaths from certain specified causes, are shown in the following tables:

	April	May	June	July
Estimated population.....	2,782,500	2,782,500	2,782,500	2,782,500
Births.....	6,793	7,024	6,776	6,761
Birth rate per 1,000 population.....	29.7	29.7	29.6	28.6
Deaths.....	2,863	2,721	2,439	2,531
Death rate per 1,000 population.....	12.5	11.5	10.7	10.7
Marriages.....	1,351	1,213	2,486	1,686
Deaths under 1 year.....	754	674	531	650
Deaths under 1 year per 1,000 births.....	111.0	96.0	79.1	96.1

Deaths from certain causes in Quebec Province

Cause of death	April	May	June	July
Cancer.....	193	160	197	171
Cerebrospinal meningitis.....	2			
Diabetes.....	36	22	31	28
Diarrhea.....	137	124	119	256
Diphtheria.....	26	11	19	19
Heart disease.....	305	341	283	272
Influenza.....	116	54	30	11
Lethargic encephalitis.....		2		
Measles.....	9	15	8	6
Nephritis.....	186	155	149	140
Poliomyelitis.....		1	1	2
Puerperal state.....	32	35	32	24
Scarlet fever.....	12	9	13	4
Syphilis.....	11	21	11	15
Traffic.....	17	36	50	48
Tuberculosis, pulmonary.....	236	211	200	185
Tuberculosis, other forms.....	68	77	63	65
Typhoid fever.....	18	16	11	11
Violence.....	74	96	127	194
Whooping cough.....	29	32	14	15

CHILE

Typhus fever on vessel.—According to a recent report, one case of typhus fever occurred in a member of the crew of the steamship *Canelos*, a small coasting vessel running from Iquique and points north to the south of Chile. The patient was removed to an isolation hospital in Antofagasta on December 28, and the disease was found to be typhus fever on December 31, 1931.

PORTO RICO

San Juan—Communicable diseases—Four weeks ended January 2, 1932.—During the four weeks ended January 2, 1932, cases of certain communicable diseases were reported in San Juan, Porto Rico, as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis.....	1	Paratyphoid fever.....	1
Diphtheria.....	8	Poliomyelitis.....	1
Malaria.....	50	Tetanus, infantile.....	1
Measles.....	97	Typhoid fever.....	3
Mumps.....	8	Whooping cough.....	20
Ophthalmia neonatorum.....	2		

Place	July, 1931	August, 1931	Sep- tember, 1931	October, 1931			November, 1931			December, 1931		
				1-10	11-20	21-31	1-10	11-20	21-30	1-10	11-20	21-31
Persia: ¹												
Abadan.....	1	3	16	1	9	37	1					
Ahwaz.....	12	84	21	3	7	31	1					
Khorramabad.....	7	69		8	18	80	45	2	1			
Mohammerah.....					10	65	30	9	1			
Philippine Islands: ²												
Provinces—												
Capiz.....												
Cebu.....	35	7	5		4	16	7	13	4	4	5	13
Siam.....	16	59	4		4	10	5	10	3	3	3	10
Ayudhya Province.....	3											
Bangkok.....	1						1					
On vessel: ³							1					
S. S. Cathay, at Kobe, Japan, from Shang- hai.....	4						1				1	
S. S. Kasagi Maru, at Moji, from Shanghai.....	1											
S. S. Ankeo, at Nagasaki, from Shanghai.....	2											
Cochin-China ¹	1											
Indo-China (French) (see also table above):												
Cambodia ¹	C	241	12	14	1	16	2		1		2	1
Cochin-China ¹	D	60	2	7	1	16	1				1	1
Cochin-China ¹	D	143	39	18	11	2	5		1	8	3	3
Cochin-China ¹	D	42	32	13	10	2	4			5	2	

¹ On Oct. 23, 1931, cholera was reported at Mohammerah, Abadan, and Ahwaz, Persia. During the period from Oct. 22 to Nov. 7, 1931, 141 cases and 97 deaths were reported.

² Figures for cholera in the Philippine Islands are subject to correction.

³ Reports incomplete.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued PLAGUE

[C indicates cases; D, deaths; P, present]

Place	July 26- Aug. 22, 1931	Aug. 23- Sept. 19, 1931	Sept. 20- Oct. 17, 1931	Week ended—														
				October, 1931			November, 1931			December, 1931			January, 1932					
				24	31	7	14	21	28	5	12	19	26	2	9	16	23	30
Algeria:																		
Algiers.....	2																	
Philippeville.....	2																	
Argentina: Cordoba Province. ¹	1																	
Azores:																		
San Miguel Island.....								2	3									
Terceira Island.....								1	7									
Belgian Congo.....								9	7									
British East Africa (see also table below):								4	2					1				
Tanganyika.....	8	4	13															
Uganda.....	2	4	5															
Canary Islands: Palma Island—Los Llanos.....	285	289	276			87	60	41	38	31								
	281	207	270			84	58	39	35	30								
Ceylon: Colombo.....	6	3	4						1						8	5	3	
Plague-infected rats.....	6	3	3						1						4	1		
Chile:	8									1					4	1		
Santiago.....			1												1			
Plague-infected rats.....			1															
Valparaiso.....		1				1												
China: ¹																		
Shansi Province ¹																		
Shensi Province.....																		
Dutch East Indies:																		
Batavia and West Java.....	58	65	113			38	39	44	39	40	75							
	58	65	113			34	38	39	44	39	40	75						
Java and Madura.....	205	233	325			133	132	150	152	171	167	212	179					
						97												

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

[C indicates cases; D, deaths; P, present]

[illegible]

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX

[C indicates cases; D, deaths; P, present]

Place	June 28- July 25, 1931	July 26- Aug. 22, 1931	Aug. 23- Sept. 19, 1931	Sept. 20- Oct. 17, 1931	Week ended—									
					October, 1931		November, 1931				December, 1931			
					24	31	7	14	21	28	5	12	19	26
Algeria:.....														
Algiers.....	1						1						1	
Constantine.....	1		1											
Brazil:.....														
Porto Alegre (alastrim).....	41	34	48	46	7	24	3	23	9	8	15	19		
Santos.....	1	1	4	2	3						1			
Rio de Janeiro.....														
British East Africa: Tuganyika.....	149	19	50	1,184		18			2			1		
British South Africa:.....	17		5	97	2									
Northern Rhodesia.....	21	26		1										
Southern Rhodesia.....	2		3											
Canada:.....														1
Alberta.....	1	1	12		1	2	2	1			2	1	9	
British Columbia.....	2	5	2			1	1							
Manitoba.....			1						1					
Winnipeg.....														
Nova Scotia.....														
Ontario.....	35	5	6	17		7	3	5	3	2	5	1	10	2
Kingston.....			1											2
North Bay.....														3
Ottawa.....			1	8		4	3	5						1
Toronto.....														
Quebec.....	1													
Saskatchewan.....	42	26	33	11	11	3	1	18	12	5	9	8	2	1
Regina.....			2										1	10
Chile:.....														21
Antofagasta.....	1													
Santiago.....					2	1								
Tocopilla.....					1	1								
China:.....														
Amoy.....	2	1	1	2	1	1	1	6	2	5	11	28	60	37
	2	1	1	1	1			4		4	7	25	20	14

Rumania (see table below).															
Siam.....	1	3													
Spain.....	7														
Straits Settlements.....	1														
Sudan (Anglo-Egyptian).....	32	6												2	
Syria (see table below).															
Turkey (see table below).															
Union of Socialist Soviet Republics (see table below).															
Union of South Africa:															
Cape Province.....															
Natal.....															
Orange Free State.....															
Transvaal.....															
Upper Volta.....															
On vessel:	2														
Brazilian ship Jabotao at New Orleans from Brazil.....															
S. S. Taif (pilgrim ship) at Suakin from Jeddah.....															
S. S. Belasco at Mobile, from Habana, Cuba, and Hull, England.....	1														1
Indo-China (see also table above).....	8	72	5	7	27	10	11	28	20	2	98	144	41	324	1
Ivory Coast.....	4	26	4	8	3	3	3	10	4	1	18	17	21	55	1
Syria: Beirut.....		4													3
China: Harbin.....	10														
Chosen.....	4														
France.....	9	4													
Greece.....	1														
Place	June, 1931	July, 1931	August, 1931	September, 1931		October, 1931		November, 1931		December, 1931		Jan. 1-10, 1932			
				1-10	11-20	21-30	1-10	11-20	21-31	1-10	11-20	21-31			

1 Imported case.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER

[C indicates cases; D, deaths; P, present]

Place	June 28, July 25, 1881	July 26, Aug. 22, 1881	Aug. 23, Sept. 19, 1881	Sept. 20-Oct. 17, 1881	Week ended—												
					October,		November, 1881			December, 1881			January, 1882				
					24	31	7	14	21	28	5	12	19	26	2	9	16
Algeria:																	
Algiers.....	2	2		1		1	1							1		3	1
Bone.....	3	1		1		11	16	11	1	1	1	1	1	1	1	1	2
Constantine Department.....	3	1		1		1	1	1	2								
Oran.....	3	1		1		1	1	1									
Bulgaria.....	D					1											
Chile:																	
Antofagasta.....	1					1										1	
Santiago.....	1					3	19	12	3								
China:																	
Manchuria—Harbin.....	3	1		1													
Shanghai.....	3	1		1													
Chosen (see table below).....	D			1													
Colombia: Cali.....																	
Czechoslovakia (see table below).....																	
Egypt:																	
Alexandria.....	1			2													
Beheira.....	1			1				1									
Cairo.....	1			1				1									
Gharbieh.....	1			1				1									
Greece (see table below):																	
Guatemala (see table below).....																	
Irish Free State:																	
Cork County—																	
Schull.....	1																
Sibboreen.....	1																
Donegal County—Stranorlar.....													2				
Limerick County—																	
Croom.....																	
Glin.....																	
Limerick.....																	
Michelstown.....																	
Rathkeale.....																	
Mayo County—																	
Castlebar.....																	
Westport.....																	
Waterford County—Lismore.....																	1

